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American Veterinary Medical Association

FORMERLY

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(Original Official Organ U. S. Vet. Med. Ass'n)

EDITED AND PUBLISHED FOR

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CONTENTS

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J. R. MOHLER, Editor, Washington, D. C.

VOL. LVII, N. S. VOL. 10 AUGUST, 1920 No. 5

ON TO COLUMBUS

THE Fifty-seventh Annual Meeting of the American Veterinary Medical Association, to be held at Columbus, Ohio, August 23 to 27, will be worth while to every veterinarian in the United States and Canada who can possibly attend. Those who have been to these conventions in past years will need no urging. These annual gatherings are occasions for renewing old friendships and forming new ones, for cultivating a fraternal spirit and developing a professional consciousness, for planning and striving for higher attainments and ideals. They afford opportunities for enlarging one's store of knowledge and keeping abreast of scientific progress and its application in practice, as well as for refreshing body and mind by escaping from the daily round and enjoying a brief period of recreation amid new scenes. In short, they combine school with vacation, service with recreation, business with pleasure.

Practitioners make up much the largest part of the profession, and their needs and interests have been kept especially in view by President Cary and Secretary Mayo in planning for the Columbus convention, as will be seen by consulting the program which appears on another page. At the same time the sanitarians, the research

workers, the specialists, the educators and the Army veterinarians will find features to interest and benefit them.

For more than half a century the American Veterinary Medical Association has been the chief agency in bringing the veterinary profession to the standing and recognition that it now enjoys. It is the main hope and reliance for future progress in that regard. It offers substantial benefits to the veterinarians of America, and in turn it deserves their support. At the coming meeting questions of policy will arise to call for wise solution. It is the duty and the privilege of members to have a part in dealing with these problems. Every veterinarian who is eligible to membership in the Association should avail himself of that professional distinction. Those who are not members, however, are none the less welcome to attend the sessions and enjoy the program, short of participating in the actual business of the Association. The convention is for the whole profession.

Not the least among the advantages of attending conventions are the pleasure and the broadening influence of travel. It is a good thing for us occasionally to visit other sections than our own and to make the acquaintance of their people. A broad outlook and a spirit of national unity and international comity are thus fostered.

Last year we enjoyed the delightful hospitality of that quaint and charming old southern city, New Orleans. Those who were there will recall the eloquent gentleman who in the closing hours besought us to hold our next annual meeting in the beautiful capital of Ohio, whose glories and attractions he depicted in such alluring terms that we accepted at once. Impatient to realize the good things in store for us, and unwilling to wait a full year for the next meeting, we even shortened the interval to nine months. In the meantime Ohio has taken on still greater importance in the eyes of the world and promises to be a center of unusual interest for the next few months.

The profession in Ohio and the citizens of Columbus stand ready to redeem the promises made in their behalf at New Orleans. They are waiting for us to come in and possess their fair city. They want us to come in greater numbers than ever before. And we are asked particularly to bring the ladies, for whom special features of entertainment are being provided. The hour of realization approaches.

Let's go!

VETERINARY RECONSTRUCTION

WE have passed through so much in the last four years that conditions of every kind are new. Things commercial, things professional, things educational present strange aspects; and the strangeness in such matters creates uneasiness. Peace came twenty-one months ago, and peace means reconstruction. In turn, reconstruction means the largest problem this country has known in many a year. Many kinds of dislocations are to be righted and many new policies adopted. We are living now in a new world and have to adjust our affairs to new requirements. Beginners are not the only ones who stand in need of study and counsel. Many of us are full of curiosity about existing conditions and in not a little doubt about what should be done. We are pathmaking along with the novices, as experience is not the guide it formerly was. In this present period of revolution and evolution it behooves us to reason logically and act circumspectly.

To us the fundamental principle involved in veterinary reconstruction in this country is based on the future status of veterinary education. This fact has been strongly presented in reviewing the psychological data obtained by the War Department in measuring and utilizing the brain power in the Army, published in *Science* of March 14, 1919. A comparison of the mental test measurements of officers in the various military groups shows that our military colleagues occupied an inferior position as revealed by psychological examining, while the engineers and field artillery officers were first and second respectively. In the January 17, 1919, number of *Science* the results are given of a standard examination for intelligence of 1,700,000 soldiers. The medium scores for recruits from different civil occupations are summarized, and again the mentality of the veterinarian is presented in an unenviable light. These tests speak for themselves and show conclusively that the A. V. M. A. has not been too urgent in its requirements for higher matriculation standards and a longer course of study.

With these facts before us, we will discuss briefly and from a reconstructive viewpoint the status of veterinary education during and after the war.

The progress of veterinary education in the United States was impeded to a considerable extent by the great world war. This was due to various causes which will be considered more in detail. To fill the ranks of the Veterinary Corps of the Army a large number of veterinary graduates were taken from civil life, because

the veterinary personnel of the Army, previous to the time the United States entered the conflict, was small in number and deficient in supplies. The new Corps was made up largely of drafted men and those who entered the service by enlistment. The effect of this method of obtaining a Corps was to deprive the general public of local practitioners, and many locations were left without expert advice in regard to diseases of live stock. Many vacancies occurred also in the veterinary service of the Bureau of Animal Industry. The supply of veterinarians available from civil-service registers to fill these vacancies was limited, and in order to continue the work of the Bureau, especially in meat inspection, it was necessary to make appointments for temporary periods. In many cases the men so appointed were not eligible by reason of their age for permanent appointment, but were efficient to supply the needs in the emergency.

The effect of the war conditions was further seen in the attendance of students at veterinary colleges. In common with other educational institutions the attendance of students decreased materially and the faculty was depleted as well as the student body. One institution reported that on account of war enlistments it had lost 50 per cent of its faculty and 66 per cent of its students.

It was considered advisable to create an Enlisted Medical Reserve Corps in order that the supply of graduate veterinarians should not cease and in order to provide capable veterinary officers for the Army. The plan of the E. M. R. C. was one by which a veterinary student could enlist and then be returned to the college where he had matriculated previously and complete his course of study, provided his progress was satisfactory and the conditions for veterinary training at the college selected were adequate. He, however, was subject to call to active duty at any time if the need for his services was urgent. This Corps was under the supervision of the Surgeon General of the Army and included also medical and dental students and hospital internes. By a ruling of the Surgeon General's Office all veterinary students in the E. M. R. C. who had been absent from college by reason of military service for more than two months were to be required to repeat the whole year, and it was planned that during vacations such students were to be ordered for temporary active duty at auxiliary remount depots. The veterinary students who were absent two months or less were to be allowed to complete their studies and after graduation were ordered to permanent active duty.

Under the supervision exercised by the Surgeon General it was

found that too many of the veterinarians employed by the Army were deficient in their basic education, and it was deemed expedient to inaugurate a plan by which future students should have a better preliminary education. It was therefore agreed that all "well recognized" veterinary colleges that desired to have their graduates eligible for positions either in the Bureau of Animal Industry or in the Veterinary Corps of the War Department should raise the entrance requirements to two years' high-school work or seven units. Evidence of this education was to be established by proper credentials, consisting of a certificate signed by the active superintendent or principal of an accredited high school, or, if the preliminary education of the student had been received in any other secondary school, the certificate must be signed by the State Commissioner of Education or other similar officer. This change affected particularly private veterinary colleges, for the reason that the veterinary colleges controlled by the States previously required high-school graduation or 14 units for entrance. The effect of this higher standard was to reduce still further the attendance of students. For this and other reasons five colleges discontinued their sessions and have not resumed them since the close of the war. One of the colleges which closed was the largest veterinary school in the United States. Several weeks ago two additional colleges announced that they would not reopen this fall.

Later, as another means of supplying educated men for the Army service, there was established a Students' Army Training Corps, the veterinary contingent of which was under the supervision of the Surgeon General of the Army. In pursuance of this plan it was suggested that all matriculants of veterinary colleges who were high-school graduates enroll at State veterinary colleges where they would be under military discipline as well as under veterinary instruction. This Corps did not begin its session until October 1, 1918, and as many veterinary students with high-school training already had entered private colleges about the middle of September, great confusion was caused by the transfer of these students. In two instances where two colleges were in operation in the same city an effort was made to combine the instruction and have it given at one institution only. This plan was not successful. The good results of the methods adopted were further impeded by the fact that the armistice was signed in November and the S. A. T. C. was disbanded the latter part of the year. Many of the students who had paid part of their tuition fees at private colleges and had begun

their studies there returned to the former institutions after the Corps disbanded. At the State colleges the situation was further complicated by the fact that barracks and facilities for Army instruction had been provided at great expense and these were of little value when the Corps was discontinued.

The students who were not high-school graduates remained at the private veterinary colleges for instruction during the fall and had completed part of their work when the change took place. This instruction had to be gone over a second time with a number of students who had made transfers, and in order that the curriculum might be completed a few of the colleges reorganized their classes, some beginning November 1 and some January 1. As the time of taking up different subjects is not the same at the different colleges —a lack of uniformity, by the way, which should be speedily corrected in this reconstructive period—it is reasonable to suppose that some work was repeated more than once and some omitted entirely. The situation was complicated again by the fact that, on account of the influenza epidemic, some of the colleges were closed during two or three weeks in October, 1918. The result is that the normal progress of veterinary instruction was interrupted and in many cases was abridged or omitted altogether. The students who composed the graduating classes were, many of them, those who failed to make satisfactory grades in previous semesters or were absent during a portion of the session on account of military service. Taking into consideration all these difficulties, it is seen readily that education was more or less deficient in some institutions during the war period.

In these reconstruction days it is evident that a change in the plan of veterinary education is needed. This is due mainly to the demand for the conservation of food in connection with the economic conditions brought on by the great war. Heretofore the emphasis has been placed on the ailments and diseases of horses and dogs, and not sufficient attention has been given to other animals; but under the new conditions a broader scope of instruction is necessary to include the ailments as well as the anatomy and physiology of cattle, sheep, swine and poultry. This instruction should relate not only to diseases but should embrace a general knowledge of animal husbandry and should cover the propagation, marketing and uses of all farm animals, their products and by-products, as well as the characteristics of each breed of live stock. The ability to identify the various breeds and types is essential to the veterinarian, who

should become a farmer's adviser and be able to instruct growers of live stock as to the best crops to be raised for fodder to provide properly balanced rations, and how to prevent diseases as well as how to cure them. The veterinarian is in reality an important factor in the agricultural development of the country, and should be qualified in its various branches, to fulfill the requirements of the lamented Pearson as an "animal engineer." Practical demonstration in the handling of these animals is also an important branch of study. On numerous occasions the agricultural press has indicated its interest in this broader training for the veterinarian, and a recent editorial in one of the leading stock papers urges veterinary schools to devote more and more attention to other than equine subjects.

When the position of veterinarian in the Bureau of Animal Industry was placed in the classified service the educational qualifications were fixed by the United States Civil Service Commission as the second-grade examination. This continued as the standard for more than 20 years and was incorporated in the Government regulations of the Secretary of Agriculture with the addition of geography and history of the United States and its possessions. In the fall of 1916, at the request of the Committee on Intelligence and Education of the American Veterinary Medical Association and by the coöperation of the Bureau of Animal Industry, the examination was changed to the first-grade examination, which was considered equivalent to graduation from grammar school.

When the War Department, through the Office of the Surgeon General, became interested in the employment of veterinarians, the educational standard was raised, with the hearty approval of the Bureau of Animal Industry and the A. V. M. A., to two years' high school of seven units or their equivalent.

It was recently announced that a further advance has been made and beginning with the fall of 1920 the Civil Service Commission will require for students who matriculate at that time four years' high-school education of at least 14 units, or their equivalent, for all accredited veterinary colleges. This is a distinct advancement in this line and places all accredited veterinary colleges, including State and private schools, on the basis of four years' high-school education.

Dr. Francisco M. Guillot has written the JOURNAL extending an invitation to those of his colleagues who want to see plenty of anthrax and Texas fever cases to pay a visit to Porto Rico.

OUR PROFESSIONAL POLICIES[1]

By C. H. STANGE, *Ames, Iowa*

IF in the following paragraphs little is said about some of the many fine things that are being accomplished by the veterinary profession and especial emphasis is placed on neglected duties and ignored responsibilities, it is not because we are unmindful or unappreciative.

We realize fully the splendid progress that is being made by the Bureau of Animal Industry in its campaign against animal diseases and in the protection of the public health. The profession should show its appreciation in some dignified manner of the sacrifice that is being made by the Chief in order that his great ability may be retained for the welfare of the public and the opportunities of the members of this profession may be the greater.

There are men in all of our educational institutions today who are refusing repeated offers of large increases in salary because their interest and loyalty to the profession and devotion to a splendid work has come to mean more than momentary gain. Under the present economic conditions this can not continue indefinitely. It is, however, a great encouragement to know that we have a profession for which many strong men are willing to make such sacrifices. It denotes progress.

The splendid record of our Veterinary Corps during the recent war, when all handicaps and obstacles are considered, is tribute to our educational and professional advancement.

The great improvement on the whole in the quality of work being done by the practitioners as compared with that offered the client a few decades ago is a source of great satisfaction to the leaders in animal industry as well as to veterinarians.

The above-mentioned achievements are most pleasant to think about, but self-praise will get us nowhere, and a satisfied condition soon leads to retrogression. Therefore let us consider carefully our mistakes, shortcomings and responsibilities, as it is only by overcoming these that we shall be able to develop a greater profession and become a more important and useful part of our great social and economic organization.

As a profession we are, even when considered in the most

[1] Paper presented at the fifty-sixth annual meeting of the American Veterinary Medical Association, New Orleans, La., November, 1919.

restricted sense, not a social or economic organization, but all dependent upon the proper association and articulation with other specialized units which together comprise our State and Nation. Certain duties and responsibilities always come with such association, and these we should be prepared to meet and discharge with the ability and dignity worthy of any great body of trained specialists. We may well ask ourselves whether we are prepared to meet these trials which will be multiplied and complicated by the rapidly changing conditions. In other words, are we in harmony and keeping pace with other professions and social units which like ourselves are an essential part of the whole organization?

I wish to call attention to the fact that unless we can measure up to public expectations and take our place along with medicine and other branches, with which we are constantly in comparison, we will not enjoy the confidence of the public nor will we secure the recognition which is so much discussed and sought after. Our attempts during the recent war to secure recognition which we felt we deserved in the Army and at the hands of our Federal authorities has led to considerable harsh criticism, but I wonder if a careful analysis will not reveal the fact that we ourselves were very largely to blame for this lack of confidence, which fortunately was very largely overcome by the diligent efforts and great sacrifices made by a number of very loyal members of our profession. We observe from past experience the simple fact that recognition comes with merit. This is commonly observed in any line of endeavor. There are those whose restricted conceptions have not permitted them to appreciate fully that it would be disastrous to the veterinary profession and of great injury to the live-stock industry if we were to get completely out of harmony and sympathy with the great public and accepted movements for improved agriculture.

When we consider carefully the good resolutions which were adopted on several occasions in this Association, providing for higher educational attainments, and the later retraction of these resolutions or amendments, which provided requirements equal to those of the leading medical schools previous to 1904, can we sincerely expect the same recognition as is accorded the medical profession? This is not an argument that we should not exert every effort to secure such recognition, but in case it is not forthcoming let us not be too harsh in our criticisms until we have demonstrated that we are not at fault ourselves.

Another important conclusion which we should reach is that

institutions or professions erected on a false basis can not stand. In planning our work and in framing our ideals we must have in mind the future of our profession and its relation to the other units of the organization of which we are a part. It seems to the writer that we have in the past been working on the foundation and are now just beginning on the superstructure of the great work which is to follow. I trust that the foundation will safely carry the weight that is about to be placed upon it.

One of the great needs of the future in our work is going to be educational support. Undoubtedly the support will come more readily as soon as the public appreciates the fact that veterinary education in the future is built upon and is a part of the public-school system of this country, for the support of which the public is willing to provide, if not always liberally, nevertheless sufficiently to maintain it in a creditable manner. I believe that it is safe to state without reservation that no veterinary educational institution in this country has been able to secure what would be approaching adequate support from public funds unless and until its requirements have been such as to follow out the logical and accepted public educational system in this country. It is but reasonable to expect that the public will not support an educational institution that is not in harmony with the general idea and plan for the education of young men at public expense. We have reached the time when a thorough education in any branch of medicine is too expensive to be provided for by a system of tuition, and only by public support or large endowments can institutions of this kind expect to do satisfactory service. We need, therefore, to adhere rigidly to our present standards, and, if necessary, to advance them somewhat, and let the public know that veterinary education is built up and is actually a part of our public system of higher education. We need more financial support, not so much for the building of new institutions as to improve those we already have. This Association is no more justified in approving a second or third rate State veterinary school than if the same institution were privately owned.

The situation in the world today, so far as veterinary education and research are concerned, it seems, should be entirely favorable to the advancement of this work in America so as to make us the leading nation in the world as pertains to veterinary education and research. The European countries which were spending large sums of money and engaged some of the most capable men, not only in

the veterinary but in the medical profession as well, to carry on research work regarding animal diseases, are at present so much indebted that in all probability they will only after a lapse of many years be able to support such work in a liberal way. I do not mean that we should take advantage of the situation because of their misfortune, but I do believe that for the welfare of the profession and the promotion of the animal industry we should exert every possible effort not only to keep in progress the good work which was being done but to initiate and accentuate much of which the profession and the public is in great need today. We have the resources; we have the men; a few trained, a large number untrained. We are unworthy, as a profession, if we fail to grasp the opportunities and train men who are capable of helping to solve these problems. The confidence and support of the public are necessary in order that such men may be retained in important and responsible positions. The considerable number of leading research men and teachers that are joining the forces of commercial enterprises does not encourage the outlook for American supremacy in veterinary educational and research fields. This Association can do much toward beginning a satisfactory solution to these problems.

With the vast live-stock resources of this country which are bound to multiply rapidly, we need not only teachers and research men as referred to above, but we need sanitarians and practitioners. These should be men who are capable of taking their place in the community and discharging their duties with credit to themselves and honor to the profession and with a distinct advantage to the public. Too many of our sanitary officials are more adept at political wire-pulling than efficient as organizers and administrators of a group of trained sanitarians. In the case of many the manner of their appointment is not in the interest of work without favoritism. In the training of practitioners we have necessarily undergone some gradual but marked changes. Ruminants and swine now command much more attention than they did ten years ago, not only in the dissecting room but throughout the entire courses of medicine and surgery, including clinics. In fact, we may expect to use the bovine species instead of the horse as a basis for our studies.

The character of the men who are to enter our profession from this time on can be absolutely controlled by the veterinary schools. If we have many colleges and a considerable number feel that it is necessary for them to accept students whether they are desirable or not simply because numbers are necessary in order to maintain an

institution, we can not hope to create a condition entirely favorable to the advancement of our profession. Throughout the Central West a general review of the situation reveals the fact that there has been a decrease of about 60 per cent in the attendance at private institutions. This decreased attendance has not brought about an increase at the State institutions, as one might think would occur. The attendance at State institutions has shown little change between the present and the attendance five years ago, with which time the comparison is being made. None of the State institutions are crowded; in fact, all of them could handle more students without sacrificing efficiency of equipment and teaching force. If there is need for four or five more State veterinary colleges throughout the Central West it is certainly not indicated by student attendance in the schools already established. The question of more State schools could very well be considered in detail by this Association, as it will certainly be an Association problem later.

A recent article published in the JOURNAL of this Association suggests that the Association follow the methods used by the American Medical Association; but it must be remembered that in 1904 there were 28,142 medical students in schools and 5,747 graduated that year. After all the discontinuations and mergers there still remain about 90 medical schools. Perhaps some of these facts may explain why the A. M. A. took such drastic steps to check the production of so many new and often poorly trained members of their profession. Even as an ardent supporter of good preliminary and thorough professional training, it is not advisable, in my estimation, to adopt the same course as was followed by the A. M. A. Our problems are not the same, and the conditions under which we are laboring are different. The following, taken from the same article, "The Bureau's two-year high-school requirement for entrance effective September, 1918, seems to be well in advance of the actual requirements of many veterinary colleges," leaves the impression that the author was not cognizant of the fact that the requirements mentioned are well below all State and some private veterinary colleges. The author evidently was not aware that this Association actually requires at the present time the equivalent of a four-year high-school course and that at least three States require the same for State Board examination. It is true that we need more thorough training rather than large numbers of students at present, but there is serious question whether we should, except in a few exceptional cases, go beyond the high-school requirement until everyone vitally

concerned has had time to become adjusted to present requirements. The schools would do well to exert their energy in addition to the instructional work along the lines of research in order that existing practitioners and future graduates may be equipped to cope with the problems daily confronting the practitioner.

In closing allow me to suggest that while we have accomplished many good things there remains very much to be done, and we should set about these problems with energy and determination. We must keep in harmony with the plans outlined and supported by Federal appropriations for the advancement of an improved agriculture. We must use every effort to secure more financial support for our public and educational organizations. Educational institutions are being robbed of many valuable teachers because of insufficient funds to pay the salaries required. The same lack of funds is jeopardizing the strength of the Bureau of Animal Industry. We need more united support for our educational work, and the colleges need to keep in close touch with newer developments and to fit the men who graduate from the institutions so that they will be able to cope with the problems confronting them. There is no need at present for advancing the requirements for admission to our schools, but we should stand rigidly by our present standards. Probably in the near future some schools will require pre-veterinary courses, but this should not be required for admission to this Association. In carrying on this work the Association should have a well-defined, comprehensive plan which the large majority of its members are ready and willing to support. No association that expects to be of influence and consequence can hope to succeed unless it has some definite policies toward which it is working and which it is ready to carry out without fear or favor.

Dr. E. G. Folsom, Jr., a member of the A. V. M. A., has located at Mt. Clemens, Mich., his boyhood home. The doctor was veterinarian for the Consolidated Coal Co., Fairmont, W. Va., for the past 10 years. He graduated from the O. V. C. in 1908 and took a post-graduate course there in 1920.

Dr. George E. Nesom, formerly State Veterinarian of South Carolina and until recently editor of *Modern Farming*, of New Orleans, La., has resigned to accept the management of a large sugar plantation in Spanish Honduras.

VETERINARY EDUCATION[1]

By C. P. FITCH, *University Farm, St. Paul, Minn.*

THE problem of education is always before us. In all lines of activity the form and method of instruction of the student are constantly changing. This can not be better seen than in the methods used to instruct the little boy or girl how to read. When most of us went to school it was the customary procedure first to teach the youngster the alphabet both in script and in type. Also how well I remember the old chart with its few and distorted pictures and "The Cat Caught the Rat" in varied forms. Now all is changed, and the little folks learn words in connection with others in a sentence. Often this is done through the medium of the well-remembered Mother Goose rhymes, which make a vivid appeal to the youngster. But a short time elapses before the child knows his alphabet, having learned it unconsciously, and also can read simple sentences. Again the popularity and widespread adoption of the kindergarten is a fitting tribute to the wisdom of Pestalozzi.

Similar advances have been made in professional educational methods. With the incidence of the fundamental basic sciences as a part of a general college education, laboratory teaching gradually became a part of the curriculum. A student learns more quickly and better appreciates the value of a natural phenomenon when he has actually performed and observed the work in the laboratory. There is no question as to the necessity of having the basic sciences as a part of every veterinary curriculum, and the better and more efficiently they are taught the better the finished product. Chemistry, physics, bacteriology and botany all have a distinct value in giving a good foundation for the special training to come later. The point, I believe, that should be kept most clearly in mind is the type of teaching that is given in these subjects. It is a natural tendency on the part of specialists in these particular lines to have a limited horizon and to see the problems of life through glass vividly stained with the essence of their own particular subject. The purpose which should dominate the teaching in these basic subjects is not to make a specialist. A chemist, a physicist or a bacteriologist is not the product desired. A broad, well-trained practitioner of veterinary medicine should be the goal of our college

[1] Paper presented at the fifty-sixth annual meeting of the American Veterinary Medical Association, New Orleans, La., November, 1919.

curricula. It not infrequently happens that the young student early generates a dislike for these basic sciences because they are taught abstractly and with little connection to the art of veterinary practice. Let us look sharply at the curriculum and note the tendency of the teaching in the basic sciences. If the student of veterinary medicine desires to become a specialist along some particular line, this instruction should be given as post-graduate work.

The aphorism "History repeats itself" is clearly illustrated by veterinary education. It follows closely the footsteps of human medicine. The nongraduate has practically ceased to exist among human practitioners. In veterinary medicine he is decreasing rapidly in numbers. The four-year course with high-school entrance requirement is now assured. This follows the demand among the medical colleges for two to four years of college work as an entrance requirement. I believe the time will soon be here when the veterinary colleges should carefully consider adopting some collegiate work as a prerequisite for entrance. However, let the watchword be "Make haste slowly." Evolutionary changes are usually much more lasting than revolutionary ones. Let us first thoroughly stabilize our veterinary training in a four-year course with high-school entrance before we attempt to add further requirements. On the other hand, this is an age of rapid advancement, and let us not fall behind in the progressive march.

Veterinary instruction is confronted with a problem peculiar to itself. From the beginning the veterinarian has been known as the "horse doctor." In one way this term was perfectly fitting, in that the practitioner earned most of his fees treating horses. With the advent of the automobile and the greatly increased value of purebred cattle, sheep and swine the character of veterinary practice has markedly changed. The name is no longer applicable. Until the present drop the value of the average hog was comparable to that of the average horse. The $50,000 and $100,000 sire was unheard of a few years ago, and if someone had told you he paid $5,000 for a pig you would have thought that "a fool and his money are soon parted." Yet these are not uncommon prices for purebred live stock today. This greatly increased value has materially added to the duties and responsibilities of the veterinarian. The large practice of the city veterinarian has dropped off because his principal source of revenue was in the treatment of horses. On the other hand, the work of the country practitioner has markedly increased, owing to the advance in the value of cattle, sheep and swine. The question which confronts the veterinary educator is so to change the

type of instruction as properly to qualify the graduate to render an efficient service to his clients in the treatment of this class of animals.

The teaching in veterinary colleges in the past has been largely devoted to the horse. The students dissect the horse for anatomy. They learn physiology based on the horse. Dosages of the various drugs are compiled with the horse as the standard. It is true that all of our institutions give a certain amount of comparative work with the large animals, but do they give enough? How much time is devoted to the diseases of swine when hog cholera is eliminated? Swine obstetrics is becoming more and more important. The diseases of sheep should receive special attention. Most important of all are the diseases of cattle. The value of the cattle, sheep and swine has greatly increased during the past decade. The following table gives in round numbers their farm value according to the 1918 Yearbook of the United States Department of Agriculture:

Comparative Value of Cattle, Sheep, Swine and Horses

	1910	1919
Cattle	$727,000,000	$1,836,000,000
Sheep	216,000,000	579,000,000
Swine	533,000,000	1,665,000,000
Total	$1,476,000,000	$4,080,000,000
Horses	$2,142,000,000	$2,120,000,000

It will be noted that during this period the value of horses has actually decreased while the value of the other classes of live stock has more than doubled. Has the teaching of our veterinary colleges made an equal change? If it has not, it is failing to give the student the training which fits him to render an efficient service or to raise the standards of the profession.

There is a great stimulus for a thorough training in veterinary medicine in the fact that general education along scientific lines includes a fundamental knowledge of the biological sciences. As was pointed out by Moore in a paper on veterinary education before this Association in 1911, "The United States Bureau of Animal Industry, experiment stations and agricultural colleges are popularizing technical knowledge and sending it broadcast throughout the country in bulletins and circulars so that those who escape the college curriculum are caught in the coils of these popular mechanisms for instruction. With a client versed in the very sciences that must be applied by the veterinarians, can a practitioner hope for

success or even for a chance of success if he himself is not in possession of a still greater knowledge of these same subjects?"

More than a majority of the large breeders of this country are graduates of colleges or schools of agriculture. Here they have received a training which renders them able to judge effectively the character of the veterinary service rendered. Many of the agricultural graduates have received some training in veterinary science, and because of an inferior service they attempt to treat their own animals, thereby not only doing their stock incalculable harm but markedly attacking their pocket-books. The remuneration for these cases is lost to the veterinary profession as well as the prestige which rightfully belongs to those who guard the health of our food and dairy animals. It is an economic loss which reflects directly on the training received in our veterinary colleges.

In this connection it might be well to state that it is our belief that the training received in veterinary science in many of our agricultural colleges partakes too much of the applied and far too little of the fundamental subjects. It is the natural tendency on the part of all teachers and students of agriculture to desire the information that immediately qualifies them to treat all the diseases to which the live-stock world may be subject. The gratification of this desire is the pitfall into which some of our agricultural colleges have fallen. The goal of veterinary instruction for agricultural students is to inculcate into the minds of our future live-stock breeders a thorough appreciation of the value of an efficient veterinary service and the vastness of the field of comparative medicine. This can be done only by giving instruction in the basic sciences and then pointing out their application. Furthermore, all live-stock owners should have information concerning the prevention and control of the infectious diseases which cause such an enormous loss. With the proper perspective agriculturists are much less likely to attempt the treatment of their sick animals, and further, they will call a veterinarian for advice in the beginning of an outbreak, for they have a thorough understanding of the dire consequences which may result if the proper precautions are not taken. They are going to demand an efficiently trained and thoroughly competent man. It is the duty of our colleges to supply this individual.

The war situation precipitated a state of affairs in veterinary instruction in this country which has hung in abeyance for some time. In 1915 there were in the United States 22 veterinary schools having 2,608 students and 675 graduates. Last year there were in active operation 14 schools. Based on the 1915 figures, the number

of students in the schools engaged in teaching last year would number 1,571, or a decrease of instructional capacity of 39 per cent. We have understood that some of these schools have this year reopened their doors, but definite information is not at this moment available.

The college year 1919-1920 finds conditions more normal for our educational institutions. The effect has been a marked increase in registration in all our colleges and universities. For example, Illinois, Wisconsin, Cornell and Minnesota have the largest student bodies in their history. Has there been a proportional increase in the registration of the veterinary colleges? Figures obtained from 12 of the veterinary schools show that the total registration is 825 students. The total number of freshmen in these schools is 272. The following table gives the details of this year's registration compared with five years ago in 1914:

Registration in Veterinary Colleges for 1914 and 1919.

College	1914		1919	
	Total Students	Freshmen	Total Students	Freshmen
Albama Polytechnic Institute	67	20	45	17
Colorado Agricultural College	60	21	84	32
Iowa State College	101	41	109	36
Kansas State Agricultural College	67	20	80	27
McKillip Veterinary College	204	82	83	22
Michigan Agricultural College	48	18	30	9
New York State Veterinary College at Cornell University	114	50	104	39
Ohio State University	185		100	33
Washington State College	40		46	6
University of Pennsylvania	122	46	54	11
Ontario Veterinary College	290		78	33
North Dakota, 2 years	11	7	12	7
Total	1,309	305	825	272

If one compares the registration of this year with that of five years ago we find that there is a decrease of 37 per cent. With the figures at hand the freshmen class shows a decrease of 34 per cent, showing that the falling off is probably about uniform in the various classes. When one takes into consideration two facts that should make for an increased registration, i. e., the four classes instead of three and the decrease of 39 per cent in instructional capacity, these figures are astounding and difficult of explanation. There is no doubt that lengthening the course to four years and raising the requirements to a full four-year high-school course has tended to

keep down the number of students in some of the schools, but we do not believe that these changes are entirely responsible. War conditions may also affect the total, but in the light of a marked increase in registration in other courses this explanation "fails to explain." The fact remains that this year the total veterinary student body is decidedly below the pre-war number.

We can not escape the thought that this is a critical period in the history of veterinary education. With the increased value of live stock, the municipal, State and Federal sanitary regulations which require the professionally trained man to enforce, the outlook for the present veterinarian is bright. We know of many country practitioners who have practices which run from $4,000 to $8,000 yearly, and these are not exceptional. We need to look carefully at our curricula and note whether we are properly fitting the embryo veterinarian to take his place among professional men. With the closing of a number and among these the largest of the private veterinary schools an increased responsibility devolves on the State schools. In order to meet these conditions there is considerable agitation toward the formation of new veterinary departments in connection with the State universities in several States. For example, this year on a notice of less than a month a two-year course in veterinary medicine was established at a State university. This was ostensibly to take care of returned soldiers. We understand that 9 students registered in this course. The multiplicity of small, poorly equipped and insufficiently supported State schools does not tend to increase the efficiency of veterinary training. The cost of properly training a veterinarian is large. It compares with the cost of instructing the medical practitioner, and ranges from $350 to $700 a year for each student. This represents only the actual instructional outlay and does not take into consideration the initial investment for buildings and equipment. These latter are an important adjunct to efficient teaching. The best-informed teacher in the world can not do his work well if the necessary funds are not provided for accommodations and laboratory apparatus.

If a State is willing to back its educational institution with sufficient money to equip it properly to give efficient instruction, and is willing to continue this backing despite a limited student body, this is an entirely different matter. Those who have had experience with legislative bodies, however, know and thoroughly appreciate the difficulty of obtaining sufficient funds to carry on the work properly.

In the light of the present registration we should turn our attention to the improvement of the existing schools. We believe that

special effort should be made to improve the instruction in the basic sciences, giving that instruction which not only grounds the student in the principles which underlie these sciences but which points out the application of these principles in the practice of veterinary medicine. More attention should be given to pathology and postmortem technic, as here it is that the practitioner learns of his mistakes. The autopsy is one of the greatest teachers, and many of our veterinarians completely neglect its significance. Mistakes often go unnoticed because the busy practitioner fails to perform a careful postmortem or is unable to interpret the findings. More and better autopsies should be a part of nearly every college curriculum, and the student should be so taught the exceedingly great value of these examinations that he will carry this knowledge to the field of practice.

More attention should be given to parasitology, and especially its relation to the diseases of sheep. You will remember that it was only two years ago that the members of the American Veterinary Medical Association were told by an eminent parasitologist that they were grossly ignorant of the first principles which underlie this science. Have our educational institutions taken steps to make good this deficiency? Let us keep the fact clearly in mind that we are not to turn out parasitologists but veterinarians so versed in this subject that they are able to recognize the ordinary parasites and diagnose and treat the diseases caused by them.

Finally, we should look sharply at our curricula and note whether there is sufficient time devoted to the consideration of the diseases of swine and cattle. Within the past few years great attention has been drawn to the diseases of the genitalia of these classes of live stock. This group of affections is alone worthy of exceedingly careful attention, and graduates should be intensively trained in their diagnosis and treatment. Our veterinary colleges are no longer educating "horse doctors," but well-trained and efficient veterinarians skilled in the diagnosis and treatment of the diseases of cattle, sheep and swine.

Let us put our shoulder to the wheel of progress in the art of imparting knowledge of the science of veterinary medicine. As Moore said in 1911, "We can do it in no better way than to dedicate ourselves anew to the work which has been so well begun, to the end that the science and the art of veterinary medicine shall come fully to share if not to lead the great wave of modern useful knowledge 'which rolls with the tide that encircles the globe.'"

COURSE TO BE PURSUED IN LABORATORY DIAGNOSIS[1]

By E. A. LOGAN, *St. Joseph, Mo.*

THE course of instruction in laboratory diagnosis should be given in the senior year, after the student has successfully completed his work in anatomy, bacteriology, pathology and chemistry, and he should be advanced as far as time will permit in theory and practice so that he will have a good knowledge of the symptomatology and pathology of the various diseases considered in that subject. This work should cover a period of not less than 15 weeks, about 4 hours each week, exclusive of urine analysis, which should be a short course in itself. In outlining the course I would recommend the following arrangement:

1. Ten hours can always be very profitably utilized in reviewing the various theories which are fundamental in all laboratory work. Necessarily this time has to be spent in the class-room, where a blackboard and some charts are available.

2. Twenty hours should be utilized in the study of known cultures of specific organisms. I would limit the number of organisms to be considered in this work to five, selecting the ones with regard to which a technician is most frequently called upon to assist the practitioner in arriving at an accurate diagnosis, and also those in which a laboratory diagnosis is most reliable. For example, I would select the *Bacillus abortus* as one organism to be considered, beginning with the isolation and identification of the organism from infected tissue if possible. If such material is not available, a contaminated artificial culture may be substituted. In connection with this work the student should be required to keep a complete set of notes fully describing the characteristics of the organism, and his observations of cultures, etc., should be recorded daily. When practicable the pathological lesions caused by the organism should be demonstrated. In some cases the inoculation of laboratory animals furnishes excellent material for this purpose. Of course this step in most cases is impossible in the limited time allotted to this course.

3. Twenty-five hours should be devoted to serological work, taking up first the agglutination test, using as an antigen cultures of

[1] Paper presented at the fifty-sixth annual meeting of the American Veterinary Medical Association, New Orleans, La., November, 1919.

each of the five organisms previously studied. This test should be completely and most thoroughly worked out by each student in the class. With the antigen prepared by the class one laboratory animal should be injected, which will furnish material for the entire class even though it be large. Previous to injecting the antigen, however, a small quantity of blood should be drawn from the animal, enough to supply each member of the class with about 5 drops of the clear serum. This should be well sealed and stored in the ice box for future use. I have found that an injection of about 5 to 10 c.c. of properly attenuated antigen is sufficient in a rabbit to produce a good agglutination in about 7 days, while 2 to 5 c.c. is a plenty to produce the same result in a guinea pig. Ordinarily one injection is enough to produce a very frank agglutination of the organism. Two injections given five days apart will not only cause agglutination to occur more readily but will be much more apparent in contrast with the serum drawn previous to the first injection of the antigen.

By actually performing these experiments it dawns upon the student for the first time just what the agglutination test indicates and under what conditions he may expect a reaction, and also the errors and complications which enter into it. He sees at once that this test would be of no avail in an acute disease, and that an immunized animal will react as readily as one actually suffering from the disease.

At the same time this work is being done the preparation of material for the complement-fixation test may also be prepared so that no time will be lost. Each student should have the privilege of running at least one test of this kind. It is the opinion of the writer that one of the best lessons in animal resistance can be so clearly demonstrated in the preparation of a hemolytic amboceptor that even the most stupid member of the class can not fail to appreciate its importance. Each of the five components in this test should be worked out by the students, and its application demonstrated.

4. Five hours' work should be devoted to the study of diseased tissue. This time can all be very profitably used in the diagnosis of rabies. The diagnosis of this disease is important and should be made by the veterinarian. It is a disease where an accurate diagnosis is absolutely demanded. Careful technique and experience are the most essential factors in the work. Aside from a microscope, such staining material as is commonly used in microscopic work is all that is needed.

STRONGYLUS RUBIDUS AS AN ETIOLOGICAL FACTOR IN GASTRIC LESIONS OF HOGS

By W. J. CROCKER *and* H. E. BIESTER, *Philadelphia, Pa.*[1]

IT is perhaps not an infrequent coincidence that a number of individuals, each expertly conversant with the clinical and epidemiological characteristics of hog cholera and other diseases of swine, differ as to the diagnosis of a particular case when all are assembled in conference and each is provided with the same history and opportunity for clinical examination. This is not at all surprising when the same diversity of opinion is not uncommon among field and laboratory pathologists during autopsy consultations, where greater opportunities for study are available.

These facts point strongly to the dearth of complete and exact data pertaining to the comparative pathology of the diseases of swine and particularly those of the alimentary tract. They show the need for a more careful and elaborate investigation of these diseases by those to whom material is available. They demand not only blood transmission controls of suspected cases of hog cholera, and bacteriological investigation, but the most exacting autopsy examinations aided by the use of a hand lens and careful histopathological routine study. In this way minute animal parasites and parasitic eggs will not be overlooked and may be proved to be far more important than is at present conceded as etiological factors in swine enzootics which so closely simulate the clinical and pathological characteristics of hog cholera and other diseases of hogs as to induce confusion in making a differential diagnosis.

Through the courtesy of Dr. J. G. Green, of the New Jersey Department of Agriculture, six 3-months-old pigs were sent to the Veterinary Laboratory of Pathology and Bacteriology of the University of Pennsylvania from a farm at Ashland, N. J., for examination. The previous history of the cases was as follows:

In January, 1919, a severe epizootic of hog cholera on a farm in southern New Jersey occasioned the loss of a large number of pigs. The outbreak was checked by the administration of the serum-virus treatment. Subsequently all the pigs from the early spring litters were lost through abortion. The offspring of later matings which were farrowed in April and May were given the simultaneous treat-

[1] From the Laboratory of Veterinary Pathology and Bacteriology, University of Pennsylvania.

ment for hog cholera at the age of 3 months. The pigs did well for a few weeks, and then a number of them, including those sent to us for investigation, developed a very bad cough followed by diarrhea. The feces were blackish in color. Emaciation and weakness developed, though polyphagia and polydipsia were manifest until the animals were unable to reach the trough. There was an elevation of temperature in the beginning, but it receded to normal and the pigs died from cachexia in from 3 to 6 weeks from the time diarrhea began.

In November, 1919, when the six pigs from Ashland reached the University, one was found dead. This pig was immediately autopsied. It presented white mucous membranes and a dry skin with scaly, parchment-like areas. The stomach contained a small quantity of semifluid brownish food material. It presented a large oval yellow diphtheritic membrane, approximately 6 inches (15 cm.) in diameter, the margin of which was lobulated. The texture appeared as though it were made up of numerous sunflower petals. The ileo-cecal valve presented small depressed necrotic areas. The liver was bluish yellow and friable, the capsule stripped with ease, hepatic structure was distinct, cut surface convex, incision filled with liquid blue blood.

The lungs were in a state of inspiration; visceral pleura smooth and shiny; small isolated areas were of meat-like consistency, and small pieces sank in water. On section these lobular areas presented a high refractive index, and mucus could be squeezed out on the convex cut surface. The bronchi contained a few *Strongylus paradoxus*. The color of these lobular solid areas was mottled yellowish red. Later pure cultures of *Bacillus suisepticus* were isolated from these lobular areas.

The spleen was slightly increased in size, margins rounded, dark red in color, incision moist, and the cut surface presented dark brown pulp, visible trabeculæ, hypertrophied Malpighian corpuscles which appeared like round translucent white tapioca-like bodies in the pulp.

The kidneys were pale grayish red, sides flattened, capsule easily stripped, incision moist, cut surface flat and characterized by a cortex of proper width, presenting faintly visible alternating red and yellow lines, and myriads of tiny red dots, which were not hemorrhages but hyperemic glomeruli of the Malpighian corpuscles, simulating a sprinkling of red pepper. The intermediate zone was

fairly distinct, the medulla was faintly streaked with red and yellow lines, and the pelvic lining smooth and shiny.

Pig No. 2 died 4 days later, and at autopsy presented the same lesions.

Pig No. 3 was destroyed 12 days after the death of the first pig, and at autopsy showed the same stomach lesions, slight lobular pneumonia, and catarrhal follicular enteritis.

Pig No. 4 died a few days after the death of No. 3. The stomach presented similar croupous membranes, a clean ileo-cecal valve and a few minute intestinal depressions. The lungs, as in the other cases, showed slight lobular pneumonia and a few *Strongylus paradoxus*.

Pig No. 5 died 4 weeks after arrival. The stomach presented the same croupous membranes. The intestines showed a mucous exudate on the surface of the mucous membrane. The lungs showed a few slight lobular pneumonic areas in the apical lobes and a few calcified parasitic nodules.

Pig No. 6 was emaciated and manifested a high degree of thirst but a poor appetite. Five weeks after its arrival it was destroyed, and at autopsy the stomach presented a slightly swollen, reddened mucous membrane, from which free blood could be removed by contact. The ileo-cecal valve was clean, and the intestines presented minute depressions. The lungs showed very slight lobular pneumonic areas. No other lesions were manifested.

At this point it must be stated that we were not dealing with an epizootic of hog cholera, as the possibility of this disease was eliminated by inoculating healthy pigs from another farm with material from pigs which presented the symptoms before described, with negative results.

Specimens were taken from the intestines and stomach, and microscopic sections made.

Stomach.—Sections from the stomach presenting croupous membranes on microscopic examination showed the muscular coats intact, necrosis of large areas of the mucous membrane, many of the folds entirely degenerated, replaced or covered by a mass of fibrin and cellular detritus in the form of a croupous membrane. (Fig. 1.) This croupous membrane contained in its meshes a great number of large oval eggs in the moruloid stage. The shells of some were dissolved and many of them were partly disintegrated, leaving numerous cells arranged in twos, threes and fours, which resembled hepatic cells. In several preparations there appeared one or more transverse sections of a roundworm. (Fig. 2.)

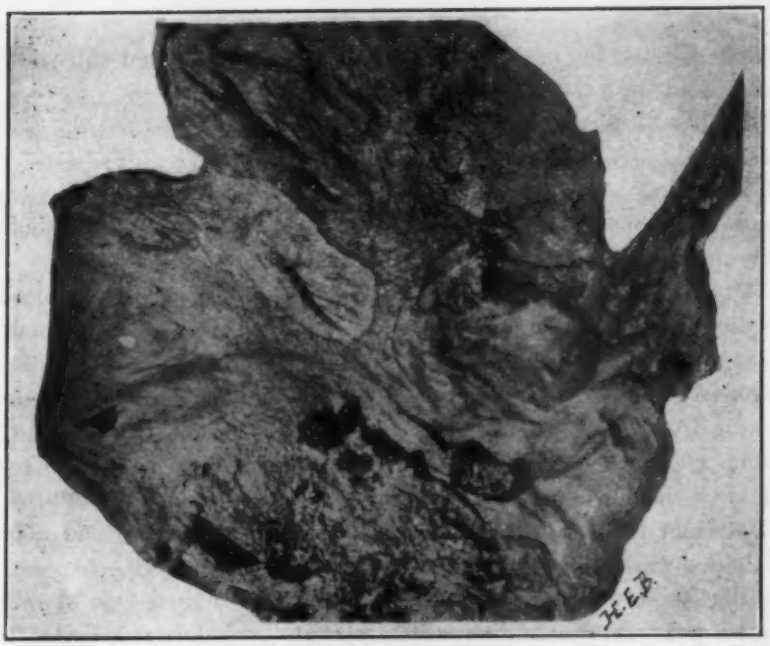

Fig. 1. Croupous membrane on the stomach mucosa of a pig.

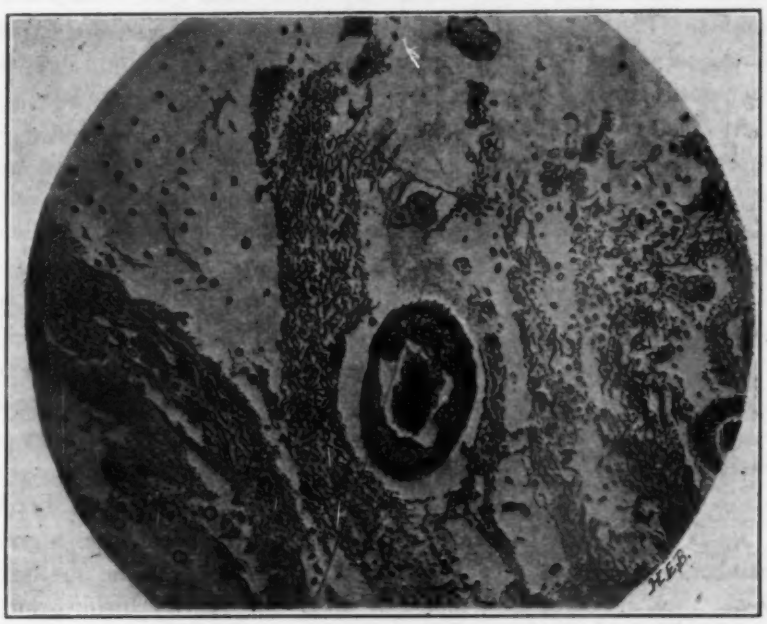

Fig. 2. Transverse section of worm and several partially disintegrated eggs in croupous membrane upon the gastric mucosa.

Intestine.—Microscopical examination of the intestinal specimens revealed nothing specific.

It might also be mentioned that sections stained for micro-organisms were negative.

The several stomachs which were taken at the autopsy table and preserved in Kaiserling solutions were later carefully examined. A great number of small worms which had the appearance of a human eyelash could be lifted from the surface of the croupous membrane and likewise taken from the interior of small teased portions. In areas of considerable size around and near the croupous membranes, where the mucous membrane of the stomach macroscopically appeared unchanged in color and texture, were small pin-point perforations. In some places these small parasites had actually burrowed half the length of their bodies into the apparently healthy stomach mucous membrane, and could be pulled out with a delicate pair of forceps.

We made about 100 preparations of these parasites. In doing this we observed that almost all the worms taken from the surface were females, while the greater number teased from the depths of the croupous membrane were males. This fact may not be of great import, but as little or nothing is known of their life cycle it may not be unworthy of mention.

Not having literature bearing upon this parasite, except its mention in the several textbooks and one article by Foster (3) on the roundworms of domestic swine, we first confused it with *Arduenna strongylina.* While in Washington we submitted several specimens to Dr. Maurice C. Hall, who identified them as *Strongylus rubidus.* We then obtained copies of the literature on this organism by Hassall and Stiles (1) and by Opperman (2). From the descriptions of this parasite as contained in these publications we confirmed the identification of our specimens as being *Strongylus rubidus.*

When this parasite was determined to be a new species by Hassall and Stiles (1) in 1892, it was described as follows:

"Color reddish, body thin, straight or coiled, as it lies on the mucous membrane. Head slightly inflated; inflated portion (female) measuring 0.012 mm. long by 0.028 broad. The cuticle is finely striated transversely, and has also 40-45 longitudinal striæ, 0.004 mm. broad, such as are seen in *Strongylus contortus* of cattle and sheep. Lateral line prominent. Mouth small, round, unarmed. Two lateral cervical spines are present 0.67 mm. (female) from the mouth. The cuticular lining divides the esophagus indistinctly into two portions. The anterior portion is 0.24 mm. long

and about 0.02 wide; the posterior portion 0.4 mm. long and 0.042 wide at the posterior end. The muscular striation of the posterior portion is much broader than that of the anterior portion. The division between the two portions lies just before the ventral pore. The intestine is cylindrical, 0.04 in diameter, greyish-black, and winds spirally with the genital organs. Cephalic glands prominent, 0.99 long, and 0.02 broad. Excretory pore 0.23–0.29 from the mouth (female).

"Male: 5 mm. long, 0.087–0.128 broad. Bursa 0.3 broad by 0.195 long, two lateral lobes continuous anteriorly, distinct posteriorly and connected by a small median lobe. Two transverse ridges divide the inner surface of the bursa into four polsters, two of which lie each side of the median line. Costæ all separate for nearly their entire length. Middle lobe with two pairs of rays. Spicules double 0.13 long, 0.02 broad. Anus square or oblong, 0.01 by 0.004. Anterior to the anus is a peculiar forked chitinous support 0.012 broad by 0.014 long, the fork opening towards the anus; a narrow chitinous strip, 0.06 long, is seen dorsal of this fork, and probably corresponds to the unpaired chitinous support found in other strongyles, *Str. contortus*, although it is very much more simple in structure.

"Female: 8–8.5 mm. long by 0.11 broad, anus 0.68 from tip of tail. Vulva 1.3–1.5 mm. in front of the anus. Directly caudad of the vulva is a small semilunar cuticular fold, about 0.04 long by 0.013 broad. Vagina is bottle-shaped and at right angles to the body wall, 0.056 long. Two uteri are present, branching off at right angles to the vagina. The first 0.2 of the uterus has a very prominent cuticle lying in folds, and is surrounded by a thick striated tissue, resembling muscle. Eggs 0.045 by 0.036; cleavage begins in the mother."

Following our experience with the New Jersey pigs, we examined the stomachs of about 400 pigs at the West Philadelphia abattoir, pigs which had passed the antemortem inspection and were apparently healthy. We found 60 per cent to be infested with *Strongylus rubidus*. The stomachs were examined very carefully at the slaughterhouse, but revealed nothing except some ulcers "covered" by parasites while others showed hyperemic areas with *Strongylus rubidus* apparently resting on top of the intact stomach mucosa in a layer of mucus. Numerous stomachs presenting normal and various inflammatory stages of the mucous membrane with parasites on the surface were taken to the laboratory, where they were very carefully examined and a great number of specimens prepared for microscopic sections.

Macroscopically many of these specimens revealed nothing to indicate that this parasite (*Strongylus rubidus*) did anything except

rest upon the mucous membrane in a harmless fashion. This belief is held by Hassall and Stiles, who report:

"So far as it is possible for us to state at present, the worm appears to have scarcely any clinical importance. It has been found in some cases in such numbers that the mucus of the stomach seemed to be blood-stained, while at other times but few were present. A number of cases were found in which there was an extensive ulceration in the stomach, but this was not constant in pigs containing the parasites; in fact some ulcers were found in stomachs where we could discover neither *Str. rubidus* nor *Sp[iroptera] strongylina,* so that we do not at present feel justified in considering the worms as the cause of ulceration, although we suspected it for some time. It can, however, be stated that in all cases where large numbers of *Str. rubidus* were found, there was an excess of thick mucus present, which gave us the impression that the catarrhal state was due to irritation by the worms.

"In some lots of hogs we examined, *Str. rubidus* was present in 75 per cent, while in others the percentage ran as low as 25. As the parasite is extremely small, it is often overlooked, and this may account in some degree for the low percentage sometimes found. It may be added that we have not counted in the 75 per cent and 25 per cent those cases where only one or two worms were found, for these could easily have been transferred to the stomachs by our hands in examination, or by contact with other stomachs in the same box, for we examined them after they had been turned inside out in the process of preparing them for 'hogshead cheese.' "

However, examination of the microscopic sections from the abattoir specimens as well as those from the Ashland, N. J., farm, showed the parasites in the mucosa, and the microscopic folds of the mucous membrane around and near the parasite were degenerated and necrosed, due to the mechanical and toxic injury upon such stomach membrane. Such necrosis can not be attributed to other causes, and it must be noted that pieces of tissue presenting such a microscopic picture appeared normal to the naked eye, and at the abattoir looked apparently healthy with the parasites merely resting on top in a layer of mucus.

Opperman (2) in 1905 reports on a case in Westphalia, Germany, as follows:

"This parasite is of importance not only to parasitologists, but also to veterinarians, inasmuch as it is responsible for enzootic affections of swine in Germany. One case of a sow which died presented at autopsy a heavy gastric infestation with these parasites to the complete exclusion of other organic changes. The lesions of the stomach, produced apparently by this parasite, were: Mucous membrane of the cardia covered by a thick, tenacious, glairy mucus.

Fundus showed highly reddened mucous membrane, presenting an area of 7 or 8 inches in diameter covered by a mass of mucus mixed with crumbly yellowish-gray particles. The apices of the gastric folds presented crumbly masses, which fused on the margins to form plates of croupous membranes on the surface of the stomach (1.5 mm. thick). Cardia mucous membrane 1.5 mm. thick. Fundus mucous membrane 3.5 mm. thick, greatly swollen, slightly elastic, and cut with difficulty. Small, delicate, scarcely visible red worms distributed over the entire surface of the gastric mucous membrane, in the clumps of mucus, and under the pseudomembranous masses. Microscopic examination of the pseudomembrane presented numerous eggs of these parasites."

Opperman confused *Strongylus rubidus* with *Arduenna strongylina* (formerly called *Spiroptera strongylina*) because the lesions found in this case of *Stronglyus rubidus* infestation were identical with the lesions described by Von Ratz (Zeitschrift für Tiermedizin, 1899, Bd. 111). Corroboration of Opperman's diagnosis of *Strongylus rubidus* was made by Von Linstow.

We experienced the same difficulty, as the lesions found in the pigs autopsied at the University were identical with those described by Foster (3), as produced by *Arduenna strongylina* and *Physocephalus sexalatus*. In about 20 per cent of the *Strongylus rubidus* infested stomachs examined at the West Philadelphia abattoir we found also specimens of *Arduenna strongylina*.

The German investigator states that *Strongylus rubidus* had never been found in Germany prior to the outbreak of an epizootic reported in 1905, and attributes its appearance on the Continent at that time to the importation of American feeds and grains which he claims to have been infested with the eggs of this organism.

Opperman reports further upon an outbreak of this condition:

"Two years later on the same premises (an estate in Westphalia, Germany) there appeared additional cases, one of which presented stomach lesions characterized by small ulcers. The clinical symptoms comprised anorexia, diarrhea, and progressive emaciation. Eagerness for particles of lime and stones. Gradually the entire herd of 30 breeding sows became involved so that in March they presented diarrhea and great loss of condition. The condition of the yard—common rooting yard by stables, ground unpaved and covered with manure of pigs and horses, which developed small wallows filled with water from manure and also mud.

"Two sows were sent to the Hygienic Institute for observation. Results: No. 1, 127 pounds, first litter, emaciated so that she could not nourish her 4-weeks-old pigs. No. 2 also became emaciated, but began to recover because of administration of vermifuge.

"Examination showed: Sleepy, inactive, coat scaly and dry.

Temperature, No. 1, 38.5 to 40° C.; No. 2, 37.5 to 39.0° C. Conjunctiva pale, feces thick and cheeselike. The animals licked the walls and stones, and were especially eager for plaster and lime. An examination of the feces revealed numerous eggs of *Strongylus rubidus*. During the several weeks of observation the appetite of No. 1 diminished considerably, that of No. 2 improved, although slowly and irregularly. This latter sow received, 14 days after arrival at the Institute, for a period of 8 days, twice daily, a mixture of Glauber's salt and sodium bicarbonate (5 to 1). After this it received a vermifuge of arsenic acid and calomel. In the expelled thin cheeselike watery feces were found very many *Strongylus rubidus* eggs, although no worms were found. Five days after the administration of the vermifuge another feces examination was made, and only 2 eggs were found. This sow continued to improve and in three weeks gained 23 pounds.

"Sow No. 1 continued to emaciate to a skeleton and died 12 weeks after arrival at the Institute. The autopsy of this sow revealed: In the stomach small amount of very mushy or gruel-like contents. Mucous membrane gray-white in fundus, with a shade or tinge of grayish red in cardiac portion, covered with considerable tenacious mucus masses. On the 3 mm. thick, strongly wrinkled, swollen fundus mucous membrane were tough, flocculent fibrin-like masses. Especially under these covers or fibrin masses were countless numbers of very small red worms, which wiggled slowly back and forth. Microscopic examination showed them to be *Strongylus rubidus*. No other organ except the stomach showed any pathological changes."

Opperman in his article describes the clinical and postmortem pictures of 4 other sows, which cases appear to be analogous to those he described previously, except that he mentions one as being affected with a slight pneumonia, which he disregards as being of no importance, and finally states:

"On the failure to unearth or show any other proof of etiological causes at the autopsy or through the anamnesis, the chronic stomach disease was the single and only result of the strongyle. As a result of this, the clinical picture, the poor appetite, the wasting away to a skeleton, must singularly and only be looked upon as the direct result following the high-grade chronic stomach affection through the *Strongylus rubidus*."

Opperman further states in his résumé:

"The changes produced by this parasite consist of a diphtheritic, i. e., chronically inflamed affection of the mucous membrane, which, especially in suckling mothers, readily produces a high-grade anemia, indicating a chronic siege, and can result in the death of the animal."

We are not inclined to believe that this parasite can of its own accord produce lesions which will prove fatal unless there is a primary cause operating which reduces the vitality of the stomach mucous membrane, and permits the parasite to cause pathological alterations characterized by inflammatory processes ranging up to the formation of croupous membranes.

In the case of the New Jersey pigs autopsied at the University of Pennsylvania the postmortem evidence seems to indicate that the pneumonia caused by *Bacillus suisepticus* is the primary cause, which is instrumental in reducing the vitality of the stomach mucous membrane, and thus permits *Strongylus rubidus* to become actively engaged in invading the stomach mucosa and produce the picture described in the first pig autopsied at the University, i. e., croupous membrane, with large numbers of *Strongylus rubidus* lodged therein, pin-point perforations, in some of which the organisms (*Strongylus rubidus*) were partly concealed and from which the worms could be removed by a delicate pair of forceps.

In the one case cited by Opperman it is believed that he considered the pneumonic lesions too lightly as not being an important factor in this condition. The other cases cited by him (Opperman) as occurring in breeding sows he states "appeared to be a chronic siege." Probably the severe drain of suckling pigs on the sows lowered their vitality and made the stomach mucosa susceptible to the invasion of *Strongylus rubidus*. Of course other causes such as inappropriate feed may likewise be a contributing factor in lowering the resistance of the stomach mucous membrane against this or any other organism.

In our opinion it appears that *Strongylus rubidus* holds the same relative position in the case of swine as *Bacillus coli* in the case of cats. This micro-organism (*Bacillus coli*) will produce a condition termed coli-bacillosis, and occurs frequently in cats which are taken from their usual habitat and environment and confined in a strange place. They will become homesick, worry and refuse food, and as a result the vitality is reduced, and the ever-present colon bacilli pass through the intestinal mucosa and produce a picture of septicemia, followed by death. *Bacillus coli* can be isolated from the intestines of healthy cats, yet this fact does not permit us to contend that there is no such disease as coli-bacillosis, nor that the organism is absolutely harmless and can not produce disease.

We can not regard *Strongylus rubidus* as a harmless parasite and as being of no clinical importance merely because it is found in

large numbers in apparently healthy hogs, for the finding of the parasite imbedded in croupous membranes, and beneath them, as well as partly perforating the mucosa, certainly must be regarded as important.

Furthermore, finding the parasite imbedded in the mucosa of sections of stomach which appeared normal macroscopically at the abattoir, and the necrosis of folds of mucous membrane around the parasite as revealed in numerous microscopic sections prepared in the laboratory, conclusively prove that this organism is capable of producing lesions.

At the same time we can not agree with the radical view taken by the German authority and consider *Strongylus rubidus* as the primary and specific etiological factor in producing disease; but our evidence indicates, as stated before, that *Strongylus rubidus* will produce a catarrhal gastritis and microscopic lesions, but will not cause the death of an otherwise healthy animal by its action on the stomach mucosa, unless some primary debilitating factor is operating to reduce the vitality of the stomach mucous membrane and permit the parasite to invade it freely. So far as is known this may be any disease which produces a chronic systemic disturbance.

Not only are the advanced lesions produced by *Strongylus rubidus,* when a primary disease process is operative, of importance in so far as they may form the port of entrance for micro-organisms but chiefly from a standpoint of differential diagnosis in cases of the septicemic form of hog cholera, when such parasitic lesions may readily be mistaken for those of hog cholera unless one uses great care, a hand lens, or anticipates the presence of these parasites, notwithstanding the difference in the time factor of acute hog cholera and this parasitic infestation.

CONCLUSIONS

1. *Strongylus rubidus* can produce severe gastric lesions and systemic disturbances, resulting in death, when a primary disease process is present which lowers the vitality of the stomach mucous membrane.

2. Very slight bronchopneumonia due either to *Strongylus paradoxus* or *Bacillus suisepticus* may constitute the primary debilitating factor.

3. *Strongylus rubidus* can produce heavy catarrhal exudate and small ulcerations of the gastric folds, which can be determined microscopically.

4. The distribution of pneumonic areas was not sufficiently widespread to induce death by pneumonia and septicemia.

5. Necessity of using care in differentiating the advanced gastric lesions of *Strongylus rubidus* and those in the septicemic form of hog cholera at autopsy.

6. Importance of checking up postmortem findings by laboratory methods and diagnosis.

7. Necessity of arousing the interest of parasitologists in an effort to work out the life cycle of *Strongylus rubidus*.

8. Closer coöperation of comparative pathologists, field investigators and parasitologists with a view of shedding light on this problem as well as diseases which may be confused with it.

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2. Opperman. Eine durch *Strongylus rubidus* bedingte Massenerkrankung bei Zuchtsauen in Deutschland. Deut. Tierärtzl. Wchnschr., Oct. 14, 1905.

3. Foster, Winthrop D. The roundworms of domestic swine, with special reference to two species parasitic in the stomach. U. S. Dept. Agr. Bul. 158. Oct. 9, 1912.

Dr. Walter J. Crocker has resigned as Professor of Veterinary Pathology in the School of Veterinary Medicine at the University of Pennsylvania, and Dr. Benjamin M. Underhill has been appointed Professor of Veterinary Pathology and Parasitology and will take over the courses in pathology and continue his work in parasitology. The resignation of Dr. Crocker took effect on June 30 and Dr. Underhill's appointment became effective on July 1. Dr. Underhill has been a member of the teaching staff of the Veterinary School at the University of Pennsylvania for 12 years.

Dr. E. I. Smith, formerly in charge of the tick eradiction force of the Bureau of Animal Industry in Louisiana and Resident Secretary of the A. V. M. A. for that State, has been transferred to Hartford, Conn., where he will assume charge of Bureau activities in coöperation with the State officials. President Cary has appointed Dr. Edward Horstman to succeed Dr. Smith, and he likewise assumes charge of the tick eradication work in Louisiana.

NOTES ON A MICROCOCCUS ISOLATED FROM CASES OF BRONCHO-PNEUMONIA (SO-CALLED "FLU") OF SWINE[1]

By CHARLES MURRAY, *Ames, Iowa.*

DURING the fall and winter of 1918-9 there occurred throughout the swine-raising States, particularly of the Mississippi Valley, a disease of swine before unobserved on so large a scale. The mortality of the disease was very low, probably less than 1 per cent, but the economic loss, due to swine being off feed for a week to ten days, and to the setback resulting, was enormous. Variously diagnosed as mixed infection, swine plague and hemorrhagic septicemia, there was much confusion among veterinarians regarding treatment. Investigation of the disease was begun late in 1918, but opportunity for careful study was not afforded because the disease began to subside rapidly about this time.

In the fall of 1919 there was a recurrence, probably as widespread as the outbreak of the year previous. Investigation of the disease was again undertaken with the view of determining what relationship, if any, the organisms variously reported as present in the organs of affected pigs bore to the disease. Rather to our surprise, we failed to recover from any of the animals examined the bipolar organism that had been quite generally credited as being the etiologic factor in the disease. Instead there appeared quite uniformly in stained smears from the blood, the spleen and the lungs a very small coccus which was successfully cultured on Huntoon's hormone agar, on blood plates and on chocolate medium.

The first culture secured was from a Duroc barrow that had been thumping badly for two weeks. On autopsy of this animal it was found that the lungs were badly congested and edematous and covered with hemorrhages on the serous surface. Well-developed catarrhal broncho-pneumonia was present, together with slight enteritis in the small intestine, the mucous surface of which was covered with a slimy catarrhal exudate. From the larynx, the bronchial tubes and the kidney of this animal pure cultures of the micrococcus were obtained.

MORPHOLOGY

The organism in primary culture was not more than 0.3 micron in diameter. After numerous transfers on artificial media the size

[1] From the Department of Veterinary Investigation, Iowa State College.

increased to about 0.6 micron. Slightly elongated forms were not uncommon. No tendency to chain or arrange in systemic order was shown. The organism shows no motility. It stains readily with the ordinary stains and is Gram negative, decolorizing very readily.

ISOLATION AND CULTURE

Initial inoculation upon plain agar yielded only scanty growth. On hormone agar the growth is fairly luxuriant, while on chocolate medium and blood agar maximum growth is obtained. The optimum temperature is 37° C. In from 24 to 48 hours colonies on blood agar attain a size of 4 to 6 mm. with an irregular shape and a smooth, glistening surface of a grayish white color, and coalesce rapidly. On agar the colonies are about half the size of those on blood agar and tend to remain discrete. Bouillon is uniformly clouded. Litmus milk shows no change at 24 hours, but after 8 days is acid without coagulation. Indol is produced after 24 hours. The organism is killed by a temperature of 56° C. for 30 minutes. Cultured on sugar bouillon containing Andrade's indicator, the results are as follows:

Reactions on Sugar Media.

	Time	Dextrose	Levulose	Galactose	Mannite	Maltose	Lactose	Saccharose	Dextrin	Xylose
Acid...	24 hours	0	0	0	+	0	0	+	0	0
Acid...	8 days	+	+	+	+	0	0	+	0	+
Gas ...	24 hours	0	0	0	0	0	0	0	0	0
Gas ...	8 days	0	0	0	0	0	0	0	0	0

PATHOGENICITY

The organism shows a pathogenicity for rabbits, guinea pigs, swine and the donkey, but not for the hen. Intravenous injection of 1 loopful of a 25-hour agar culture caused the death of a rabbit within 60 hours. Swine injected intravenously with 1 agar culture 24 hours old died of septicemia within 24 hours, while those injected with smaller quantities showed the same clinical picture as pigs suffering from a natural infection, dying later, and disclosing on autopsy the same pathological changes as were observed in pigs dying in the field. The hen proved highly resistant to infection, showing no effect from an intravenous inoculation of two 24-hour agar cultures. Subcutaneous injection of moderate quantities

of culture and feeding experiments with massive doses, together with pen exposure tests of healthy pigs with pigs both artificially and naturally infected, have not in a very limited number of trials produced the disease.

Pigs artificially infected showed on autopsy the same lesions as those dying from natural infection. The following autopsy record is typical:

Typical Record of Pig Artificially Infected

Pig No. 3959, injected intravenously with 0.6 of a 24-hour agar culture December 17, 1918. Died December 21, 1918. Was unable to get on its feet the day following injection. Showed labored breathing and manifested pain when handled. Remained recumbent until death. Highest temperature recorded, 102.6 on December 20.

External Examination.—Bluish discoloration of skin of belly. Froth in nostrils. Rigor mortis marked. No discharge from natural openings.

Digestive System.—Passive congestion of all organs. Sanguineous peritoneal fluid. Marked gastritis with slimy, bile-stained exudate over mucosa of stomach. Congestion of serous and mucous surfaces of small intestine. Dry mucosa and reddened folds of large intestine. Liver slightly congested.

Respiratory System.—Epiglottis, glottis, larynx and trachea congested. Bronchioles filled with reddish yellow frothy fluid. Left lung showed metastatic congestion. Right, in full inspirium.

Vascular System.—Heart stained by hemolyzed blood. Endocardium and chordæ tendinæ covered with petechiæ and ecchymoses. Spleen slightly enlarged and dark bluish red, edges rounded.

Lymphatic System.—Lymph glands swollen, juicy, congested, and with few hemorrhages.

Urinary System.—Bladder reddened. Kidneys slightly congested. Parenchyma firm. Capsule stripped readily. Petechiæ at the base of the papillæ.

IMMUNITY

Pigs recovered from the disease have shown very irregular susceptibility to injections of the organisms following their recovery, some succumbing to large doses intravenously, others showing no effect. The test for agglutinin in the blood of sick and recovered pigs showed little or none present in dilutions above 1 to 20. The blood of one pig infected by intravenous injection of 0.9 agar

culture showed, after two months' sickness, an agglutinating titer of 1 to 320. A hen that received six weekly intravenous injections totaling 5 agar cultures showed an agglutinating titer of 1 to 1,280.

SUMMARY

A small Gram-negative micrococcus has been isolated with marked regularity from a number of swine suffering from broncho-pneumonia, so-called "flu."

Intravenous injection of large doses of the organism into swine and intraperitoneal injection into rabbits and guinea pigs have caused death from acute septicemia. Similar injections of smaller quantity of culture produce the disease running a typical course. The pathological changes in animals thus killed resemble very closely those found in swine dying from a natural infection.

Serological tests indicate that agglutinins for the micrococcus are present in the blood of affected and recovered animals in low dilutions and that by systematic immunization these agglutinins may be markedly increased.

ACKNOWLEDGMENTS

I desire to acknowledge the coöperation and valuable suggestions of Dean C. H. Stange, and the splendid help of my assistant, Paul Purwin, for his painstaking laboratory work.

Dr. J. J. Jones has recently resigned from the position of Assistant Inspector in Charge of Tuberculosis and Tick Eradication work on the Bureau force at Jackson, Miss., and has accepted the position of general manager of the Dantzler Farms in Harrison County, Mississippi. These farms comprise more than 100,000 acres, the activities of which are devoted to cattle and sheep raising and general farming. Dr. Jones has been in the service for a number of years and the Bureau loses a valuable and highly trained man; however, his services will still be devoted to building up the live-stock industry. The Dantzler people are to be congratulated for having secured Dr. Jones and we wish him much success in his new undertaking.

Prof. A. Railliet, the eminent French parasitologist and veterinarian, after a service of more than forty years on the faculty of the Alfort Veterinary School, has been placed on the retired list. Prof. A. Henry has been promoted to the chair thus vacated.

GREETINGS TO THE VETERINARY INSPECTORS OF THE BUREAU OF ANIMAL INDUSTRY[1]

By VERANUS A. MOORE, *Ithaca, N. Y.*

I WAS asked to read a paper before this section on "The Bureau of Animal Industry, Its Past and Future." I have been so fully occupied, however, that I have been unable to prepare the paper, much as I wanted to do so. I am obliged, therefore, to substitute a few extemporaneous remarks for such a paper.

I would like to say a word about the earlier days of the Bureau, its present work, and possibly a prediction for the future. I think I am the only active member of the Association who was in the Bureau at the time the meat-inspection work was started. I happened to be a member of the first committee, of which Dr. Theobald Smith was chairman, to set the examination for the Bureau of Animal Industry inspectors under the Civil Service Commission. It would not be very complimentary to the veterinary profession to state the percentage of failures among those who took that examination. I will say, however, that a few of them passed.

I do not know of any criterion with which we can measure the advancement of veterinary medicine and education more than by the civil service examination for Bureau inspectors. There were about 60 veterinarians who took the first examination. The results of the second examination were quite a little better than those of the first, and thereafter, so long as I was in the Bureau, they improved steadily, although the percentage of failures was much higher than at the present. Of course the reason for the failures in the beginning was the fact that the inspection required the application of knowledge concerning animal diseases that the veterinarians were not acquainted with nor even had been taught. The practitioners, and they were all the veterinarians that were in the country, knew very little about morbid anatomy, the etiology of infectious diseases, or the relation that exists between the diseases of man and beast.

The meat inspection work in this country began in answer to the demand of the German Government for a Government guarantee of our pork. The first inspection consisted in stamping the boxes in which the meat was packed. That was not acceptable. We then

[1] Address before the Section on Sanitary Science and Police at the fifty-sixth annual meeting of the American Veterinary Medical Association, New Orleans, La., November, 1919.

made a microscopic examination for trichinella. The Bureau employed a large force that examined microscopically the sections of flesh that were taken by the veterinary inspectors from the carcasses. Further, the specimens were examined from each hog. The development of the microscope, apparatus for making the examination, that is, the slides for squeezing the pieces of meat, and the designing of a suitable stage, were matters of considerable interest to the Bureau and manufacturers as well. The microscopic examination continued for a few years. When it was found that the trichinella cysts in pork became innocuous after a somewhat limited period in either pickle or dry-salt preservation, this form of examination was discontinued.

The real meat inspection, however, began after the passage of the bill that President Roosevelt signed in June, 1906. This law gave the Secretary of Agriculture, through his veterinary inspectors, authority over the sanitary conditions in the packing houses. From that time to this there has been very rapid progress in the improvement of the conditions under which the work is done as well as in the efficiency of the inspection.

The physical condition of the packing houses in the earlier days was not very acceptable. At least it would not be at this time. The large packing institutions of today began as small enterprises. The packer started with a small slaughterhouse, and as his business extended he built an addition or lean-to, and as the industry continued to grow he built other additions, so that at the time the 1906 law was enacted many of the large packing houses were dark and dingy structures. They extended over a large area, were low between ceilings, were dark because they were so large that sunlight could not get through them, and they were not always kept clean.

The tirade that was started in 1905 against the packing business began by an inspection of the Chicago packing houses by a man representing the London *Lancet*. Then the work of Upton Sinclair created much sensation in this country, and as a result the meat-inspection law of 1906 was passed, giving authority to the Secretary of Agriculture, through the inspectors, to look after the sanitary conditions of the establishments and also the inspection of the meat after cooling and preserving. Before that the carcasses were inspected for disease only. This law providing for the inspection of the meat as it left the establishment has caused, as you know, the condemnation of hundreds of thousands of pounds of meat and meat products that were not considered fit for human food.

I have spent considerable time in the packing houses of the old country. We have heard a great deal about the German meat inspection. While they went into certain details, away beyond what we were doing, I think many carcasses "got by" that would have been condemned in this country. I have felt since that experience that we have no reason to feel ashamed of the work in this country, but rather congratulate ourselves on having a meat-inspection service equal to any.

A few years ago I was requested, together with others, by the Secretary of Agriculture to inspect the packing houses, that is, to inspect the inspectors, as it were. A good many people had criticised the Bureau inspection. As a result the Secretary appointed a committee to visit the establishments and to make a report and such recommendations regarding the inspection as seemed desirable I was assigned New York, Philadelphia, Buffalo and Pittsburgh. I visited all of the killing places in those cities and nearly all of the process houses. I am frank to say that I do not know of any business where more improvement has been made. Over $2,000,000 were being spent that year in those cities in the rehabilitation of places for slaughtering animals, handling meat, and equipment. For these better sanitary conditions and more cleanly methods of handling of meat and meat food products we are indebted to the veterinary inspectors of the Bureau of Animal Industry.

You who are in the service may feel a little impatient at times because improvements are slow or because a house does not have the facilities that it would seem it ought to have. However, when one passes judgment on these things, he must take them in their entirety. The improvements that have been made by packing houses in equipment and facilities during the last twenty years has been little less than marvelous. While betterments may seem to come slowly, nevertheless measured by the time these industries are to continue and the difficult problems that the packers, especially the smaller ones, had and still have to contend with, there is every reason to feel encouraged.

At the beginning of the Federal inspection there were a great many food-producing animals. The loss of a few carcasses did not amount to much, and of course, like everything new, there were people who wanted to condemn everything possible. There are those today who say one should not pass a carcass for food in which the smallest tubercle that can be detected with the unaided eye exists or that contains any other lesion whatever. If these opinions were

to obtain there would be, as you know, a great deal more fertilizer than meat coming from the packing houses.

At first there was a tendency to condemn carcasses that were infected but slightly with tuberculosis. In the law under which you are operating the requirements are not so detailed or severe, but rather deal with fundamental principles which are to guide the inspector. You know these principles as laid down in the regulations. I believe in the future there will be still more leniency. Compared with the inspection in Germany in 1905, we are justified in making them so. One saving that is being made is to allow certain carcasses that are on the border line to be sold for food after they are sterilized properly. The introduction into the abattoirs of sterilizers to render such carcasses perfectly safe for human consumption is a step in the right direction. This plan was recommended in 1907 at a conference where B. A. I. Order 150 was being considered. At that time a representative of the packers objected to the introduction of sterilizers because, as he said, it would act deleteriously on the business. Since that time many of the packers have concluded that the sterilizers are a good asset and as a result much meat is saved.

Men who enter a profession, especially the medical professions, do so with the primary purpose of rendering service. Any man who goes into veterinary medicine should understand that he must submit to a life of what has been called "honorable poverty." He is going to receive a salary that is very modest or fees that are not large, and he can not expect to accumulate wealth from his professional work. I do not know where our people are receiving a more beneficial and protective service than by the Federal veterinary and lay inspectors. You should realize that you are each doing your part in helping and improving the conditions of the meat industry and particularly in safeguarding the people against the diseases of animals communicable to man. You should recognize this fact and in a spirit of service be comforted by it.

There is another point that veterinarians in the Bureau should remember, and that is that they are, after all, in the full sense of the word, professional men. The man who becomes a great surgeon, for example, seems to you as inspectors and to me as a teacher to be rendering a much greater service to the world than we are. I was talking not long ago with one of the best surgeons in this country. I happened to be present at a very difficult operation, and after it was over I complimented the surgeon on the operation and

congratulated him on the great service he was rendering. He replied by saying: "We are not doing anything in the way of service as compared with what men who are teaching and engaged in research are accomplishing." So you see the other fellow's point of view.

I learned long ago as a boy in the lumber woods that the pleasant things were not all in one place. We see the sunny side of the other man's position; we do not see always the difficulties. I want to assure you that while continuous routine work may be tiresome at times, and that while you may feel that other phases of veterinary work offer greater opportunities, they all have their difficulties. The burden of an occupation is due to the attitude of mind toward the task as much as anything else. You are rendering a service that will compel eventually the people who consume the meat and who are thus recipients of your service to understand what you are doing for them, and after a time the wrongs, if there are any, will be adjusted. I congratulate most heartily the Bureau inspectors on the public service they are rendering and also on the opportunities they have for study.

I went into the Bureau in 1887, when there were, I think, three men engaged in scientific work outside of the Chief, Dr. Salmon. At that time his administrative duties had become so pressing that he had very little if any opportunity for research. The law establishing the Bureau provided that at no time should the personnel of the technical workers exceed twenty men. That has been changed. Now there is a large number of veterinary inspectors employed in packing houses; in the eradication of the cattle tick; in the quarantine service; and in tuberculosis-control work. A great army of workers has grown up and there are demands for many more. The eradication of foot-and-mouth disease and of contagious pleuropneumonia of cattle stand out as great monuments to veterinary service in the Bureau.

There is one other thought I wish to emphasize and I will close. It is that Bureau veterinarians belong to the veterinary profession. You do not want to feel that you are tradesmen. You want to keep the professional spirit alive and active all the time. The world for us is what we make it, and opportunities in inspection service are not of small proportions. Those on the outside see them. Perhaps if they were working inside they would be too weary with the routine to distinguish them. I want to tell you, men, that if you look to those who have succeeded you will find they have risen above the

average because they had a vision and were willing to do hard work.

There are a great many things in the inspection service that can be improved. However, there is no man that can come in from the outside and make these changes. I had that impressed very forcibly upon me at the time I was making the inspections already referred to. I saw many things that I thought were very bad, but when I came to talk with the chief inspectors and sometimes with the owners of the plants they brought out facts that were fundamental in the situation that I had not seen at all. The advancement of the service is to come from within. Progress is through evolution and not revolution. Every one of you has the opportunity to advance the work in some particular, and in doing this you should be happy. You want to be doing those things that will keep the mind as well as the body active. Someone has said, "He has achieved success who has lived well, laughed often and loved much; who has gained the respect of intelligent men and the love of little children; who has filled his niche and accomplished his task."

I tried to point out in my address the other morning that we have distinct groups of veterinary service. They are the teachers and the research men; the practitioners; the State live-stock sanitarians; Army veterinarians; and Federal veterinary inspectors. There is a special function for each of these groups, and when they are taken together they touch all of the health and sanitary problems that affect the animal industry of the country. This profession is of the first importance economically to the nation in safeguarding the production of dairy products, meat and leather. It is also of significance from the sanitary point of view. In this you are playing a very important rôle.

I am wearying you with a talk more or less irrelevant to the subject assigned. However, I want to assure you that I appreciate the privilege of speaking to the Bureau inspectors. I started with the Bureau when its laboratory was up in the attic of the main Agricultural building. No one dreamed in those days of the magnificent laboratories it now has in Washington and of the large number of men engaged in the work. The growth has taken place during the last thirty years. What the development will be in the next thirty years no one dares predict. I am confident, however, that it will be along lines of better protection to the live-stock industry of the country.

Again I congratulate you upon the very important service you are rendering to the public.

SOME NOTES ON CONTAGIOUS ABORTION

By G. E. JORGENSON, *Clermont, Iowa*

THERE is no disease rampant among the dairy and beef cattle in this country that is more difficult and more unsatisfactory to treat, both from the aspect of the veterinarian and the stockman, than contagious abortion. In the first place there are no adequate laws for the control and isolation of infected animals, nor has the proper interest and coöperation been shown by the stockman. Herds have become infected heretofore and no special attention given the aborters except to rebreed them. Individuals failing to expel the afterbirth were in many cases allowed to go until the retained afterbirth had rotted away. Animals from infected herds have been sold widespread. Neighbor cows have been allowed to be served by infected bulls. This has resulted in a rapid spread of the disease, with the result that contagious abortion is found in almost every community.

The writer has for years been making a special study of this disease and its treatment, and it has been his experience that fairly satisfactory results may be obtained if the following rules are carried out:

1. Whenever a continuous chain of abortions occur in a herd contagious abortion should be suspected and the diagnosis verified by the isolation of the *Bacterium abortus* Bang, which is considered the causative agent, and by the agglutination test of the blood of the suspect.

2. Once the diagnosis has been made, careful isolation of all aborters in separate and distant stalls from the other animals should be carried out and all discharges, soiled bedding, afterbirth and fetus burned.

3. All aborters should be given the proper treatment indicated for that individual case. That is, afterbirths retained should be treated, and subsequent acute or chronic inflammation of the womb, tubes and ovaries overcome before the animal is rebred.

The writer makes it a practice never to allow a patient to be served until three weeks after all pathological discharges have stopped. While there is some question among the veterinary profession as to the value of bacterins, the writer has by experiments on a number of animals demonstrated that the opsonic index is raised and the agglutinating power of the blood increased by several

increased dosage injections of killed suspensions of the *abortus* organism, hence, inasmuch as no harm can come from the use of them, he is using them pending the absolute proof of their value or non-value.

A recapitulation of the above three rules of treatment follows. The diagnosis of this disease does not and should not seem difficult. The recurring chain of abortions in itself is almost positive and conclusive evidence of the presence of the disease. It, together with a positive agglutination test (over 1:100 dil.), is considered by the writer as indisputable evidence of the presence of the disease. The presence of the *abortus* organism is also of importance, although I would not consider it positive for the reason that I have in four different animals been able to demonstrate the *abortus* organism in animals that did not abort and were not members of an infected herd at that time.

By isolation we mean placing the aborter in a stall or pasture to which no other members of the herd under any circumstances could gain access. Here the animal remains until all signs of inflammation and discharges have abated, and to make it still more safe we add three weeks more to this quarantine. Careful attention is given to disinfection of the premises and of the attendants, who are instructed to care for these animals after all the others have been attended to and then only after donning a suit of clothes used only around these patients. Strict adherence to this is insisted upon.

Treatment consists of the ordinary gynecological procedures which are indicated for each individual case. Retained afterbirths are cut off so that no part protrudes from the vagina, and daily irrigations of the uterus with a normal salt solution done, until the afterbirth is gradually loosened from its attachment to the cotyledons. This usually obtains on the third or fourth day. However, some of these cases are very tenacious and it is almost impossible to remove them except by allowing them to liquefy gradually. In such cases the necessity of daily irrigations to remove accumulated products of putrefaction to prevent the absorption is obvious. Furthermore, we use in these cases a 5 per cent solution of chlorazene to aseptisize as much as possible the uterus and contents. This is a long and tedious process. However, I would rather do this than to do a manual removal of part of the afterbirth as done heretofore. I say partial for the reason that I defy anyone to go out and remove every bit of the placenta in those cases where it clings to the cotyledons with a grip of inseparable tenacity. All that is

gained by such a process is part of the placenta, while many or a few cotyledons, as the case may be, are torn off, lacerated or otherwise damaged, leaving an avenue of infection for secondary invaders with a subsequent septic endometritis, acute or chronic, depending upon the virulence of the organisms involved, followed by a gradual pathological change in the uterus and its glands, and in some cases pyo-salpingitis with occlusion of the tubes, and even an attack upon the ovary itself.

After the uterus has been emptied of the placenta the irrigations are given at three-day intervals. In doing this we use a speculum and uterine forceps, drawing the cervix backward until we are able to insert a return-flow catheter, and from 2 to 6 gallons of sterile normal saline solution is allowed to flow into and out of the uterus. In certain conditions where astringents or mild antiseptics are indicated by the condition of the uterine mucosa they are used; however, we are not in favor of shotgun mixtures in the form of capsules, believing that the less chemical irrigation we cause the better are the chances of aborting inflammatory changes in the uterus and subsequent sterility.

It would be fitting to mention here those conditions of the ovaries occasionally seen causing symptoms, as inability to conceive, nymphomania, etc. These symptoms are usually due to cysts, generally with sterile contents and probably due to unruptured Graafian follicles or to unabsorbed corpi lutea. They may be palpated through the rectum and usually ruptured with the hand. I have examined a number of them for organisms, but have never been successful in demonstrating any organism either by smears or by inoculation of media.

Returning to the treatment of true contagious abortion, I find that those cases that develop extensive inflammatory conditions are usually sterile when the inflammation subsides, due to the changes in the uterus. However, as Dr. De Vine points out, the infection and pyometria following an abortion are not due to the *Bacterium abortus*, but to secondary invaders. In my experience I have found that in the majority of cases the *Bacterium pyogenes bovis* and a low-virulence form of the *Staphylococcus albus*, together with a few colon organisms, are the offenders. In those few unfortunate individuals where we find the *Streptococcus pyogenes* present the result is invariably death from a general sepsis in two or three days.

By considerable work along experimental lines we have demonstrated to our satisfaction that administration of the suspensions of

killed *abortus* organisms raises the opsonic index and does increase the agglutinating power of the animal. Basing our action on this, we use this product in the treatment of these cases.

In conclusion, we have as our goal in the treatment of this disease, first, the prevention by sanitation and isolation; secondly, the curative treatment of those aborting, to the end of overcoming the secondary infection following such abortion for the purpose of preventing sterility, and thirdly, a gradual building up of an active immunity in the animals comprising the infected herd.

FATHER GOOSE ON SHEEP PARASITES

If stomach worms affect your sheep,
Copper sulphate treatment's cheap.

If you see your sheepie scratch
  And rub and bite and kick,
It's time to dip the little cuss
  And kill the louse and tick.

Little Bo-Peep, come blow your horn,
Your sheep have the scab, just as sure as you're born.
Get the lime-sulphur and clean out the vat,
And we'll save the old sheep and their wool, mutt'n fat!

"Baa, baa, black sheep! Have you any wool?"
"Yes, sir! Yes, sir! Three bags full.
I haven't any maggots, and I haven't any itch,
And if I dodge the stomach worms, you'll all get rich."

A bladderworm lived in the brain of a sheep,
  And the poor sheep had the gid;
So he walked around in a circle—
  And that was all he did.

A tapeworm named Tænia lived in a dog,
And down where he lived it was dark as a fog.
He had no eyes and he had no legs,
And his tail was full of cute little eggs.

—M. C. H.

THE INFLUENCE OF THE HEALTH OF THE CALF UPON ITS FERTILITY AT BREEDING AGE[1]

By W. L. WILLIAMS, *Ithaca, N. Y.*

THE problem of reproduction in cattle (and in other domestic animals) is one of constantly growing importance. In pedigreed cattle the condition is critical and seriously imperils an adequate milk and meat supply. At present, as it has been in the past, the chief study regarding interferences with reproduction is being concentrated upon the pregnant animal and means sought to insure birth and to obviate the interruption of pregnancy by abortion. More recently serious attention is being given by some to the problem of nonconception, and in the judgment of some veterinarians the time has arrived for consideration of the influence of the health of the calf upon its fertility as an adult. The scope of study is thus broadening until now it involves essentially the whole span of life.

The average pedigreed cow, so nearly as I can estimate, reaches an age of about 6 years, conceives four times and calves three times. She is pregnant about 47 per cent of her life and nonpregnant 53 per cent. The dairy cow yields milk about 44 per cent and is dry or unprofitably in milk 56 per cent of her life.

The pregnant state is not a propitious time to influence directly the health of the pregnant uterus or of the contained fetus, because the physiologic uterus during this period is hermetically sealed so that its interior and the fetus are not approachable except at great peril. The fetus can not be reached indirectly through the blood stream. The placenta constitutes the most efficient filter known. When healthy it bars all known bacteria, toxins and antibodies and does not permit the passage of the most highly soluble dyes like the anilines. Infections existing within the pregnant uterus or in the fetal body or its annexes are not, therefore, available for attack. So far as known, no substance introduced into the body fluids of a pregnant animal is thrown into the utero-chorionic space to affect favorably or unfavorably any infection resident there. Clinical observations support the belief that antiseptics, sera, bacterins or other agents used to overcome infection do not reach nor directly affect infections existing within the uterus or fetus.

Under these conditions it is not strange that some investigators

[1] Paper presented at the fifty-sixth annual meeting of the American Veterinary Medical Association, New Orleans, La., November, 1919.

and practitioners are seceding from that group which would limit activities to the pregnant state and are achieving valuable progress in their work with nonpregnant animals. They are finding that infections resident in some portions of the genital tract are open to direct attack under well-known surgical principles, and that the employment of available means during nonpregnancy decreases the sterility, lowers the rate of observed abortions, tends to obviate metritis and placentitis, and advances the number and vigor of calves born. The successful invasion of this field has broadened the area of activity more than 100 per cent.

There remains, however, an important era in the lives of animals which has been largely ignored in so far as reproductive efficiency of the individual is concerned. If a calf dies its loss is recognized, but if it is diseased and apparently recovers little attention has been paid to the possible effect of the disease upon its reproductive efficiency at breeding age. The period elapsing between birth and breeding is usually 15 to 20 months, or 21 to 27 per cent of the average life of the animal. It is a period in which there is much peril from chronic infections. It is of concern in relation to any chronic infections of intra-uterine origin and of post-natal infections from milk or other foods. My contention has long been that in the great problem of reproduction conscientious and earnest study should be given to the health of the individual from the fertilization of the ovum to the end of its life. The practitioner of human medicine prevents much gonorrhea by disinfecting the eyes of newborn infants and watches with concern for the advent of signs of syphilis from intra-uterine invasion. If he can not control the infection here, then the outlook for control at other periods is very dark.

The infections of the genitalia of animals which interfere with reproduction have been largely ignored during all periods except pregnancy, chiefly if not wholly because of the rigid and narrow belief that they can exist and are destructive in the uterus only during pregnancy. In 1912 I first ventured to express the opinion that the health of the young calf directly affected its reproductive efficiency as an adult. Naturally this view aroused very scant interest amongst either breeders or veterinarians. The belief was entirely too heretical for any orthodox adherent of the "contagious abortion" hypothesis as then understood.

The questions involved are extremely complicated and demand far more research and observation before a true and satisfactory

conclusion can be reached. The evidence now on hand, however, seems to me ample to justify its presentation for discussion.

Veterinarians and breeders have naturally agreed that the health of the calf should be guarded from the standpoint of peril to its life, and also that disease should not interfere seriously with growth. In the researches conducted by my department regarding the infections of the new-born, two lines of thought have been kept side by side. It has been aimed to discover how these infections may be most efficiently controlled in relation to the immediate welfare of the calf; and to determine, assuming a relationship between the health of the new-born to its later breeding efficiency, how the calf may be best reared in order to secure the highest efficiency later as a breeding animal.

The two objects cited rest upon many fundamental questions which need to be decided as far as possible before dealing with the final problem. In the first place, it is essential to know how early in the history of an individual it may become infected and its existence or health placed in peril. It is next to be determined how long an infection, which has failed to cause the prompt death of the individual, may be able to persist and to continue as a peril.

It is not aimed here to discuss any one bacillus or other microparasite directly, but to consider infections of the reproductive organs generally. It will be convenient at times to designate certain named organisms, but that is merely for clearness. The term "contagious abortion" will not be used. When the term "abortion" is used, unless expressly stated otherwise, it will mean that the fetus has succumbed directly or indirectly to infection and that the cervical end of the uterus has suffered from an endometritis due to an infection which caused the uterus to contract and expel the fetal cadaver. No effort is made to designate the infection causing the fetal death or its expulsion by the uterus.

There is no moment in life over which the cloud of infection fails to cast its shadow. In the brief, independent existence of ovum and spermatozoon, infection is commonly present and menaces their lives. The researches of Day, Hagan and Carpenter have demonstrated clearly that the cervices, uteri and oviducts of a majority of nonpregnant cows and heifers carry infections. Clinically it is these infections which destroy the spermatozoon or ovum or both prior to fertilization or at too early a stage for the recognition of conception. These infections in the genital tract are by no means transient. If they endured for a short time only, they

could be only rarely recognized by cultural methods. Instead they are so common that the infection is evidently extremely chronic and exists at every age thus far investigated. In sterile heifers, when the sterility is not due to arrest in the development of the genital organs, Carpenter has not failed to find bacteria culturally in the uterus or oviducts.

Conception fails to eliminate resident infection from the genital tract. Quite on the contrary, the advent of an embryo with its annexes in the uterus accelerates bacterial growth of any infections within the genital canal. The delicate embryo has no power to resist bacterial invasion, and the power of the infected uterus to protect the contained embryo is too feeble, if it exists at all, for definite recognition. It then becomes a trial of power between the infection on one hand and the uterus and contained fetus on the other, whether the pregnancy shall proceed in orderly manner and birth occur, or whether the pregnancy shall be interrupted by abortion, by death and maceration or mummification of the fetus, by premature birth or by birth at full term associated with evident placentitis or metritis. The researches of Hay, Hagan and Carpenter, showing that most pregnant uteri of cows and heifers carry infection, show clearly and emphatically that the infections of the genital tube in nonpregnant and pregnant cows are continuous and identical.

Such genital infection does not end with pregnancy. After abortion or calving there is so commonly a scarlet discharge from the genital tract that Fleming speaks of it as normal and terms it "lochia." In many herds one may readily recognize clinically pus in the uterus or cervix of 20 to 75 per cent of the cows 6 to 12 months after calving or aborting. It is thus firmly established that infection of the genital tube exists in a large proportion of cows and heifers, and that the infection is continuous from the preconceptional era of the heifer, through pregnancy, into and through the post-parturient period. Naturally the infection varies. Now one and then another species of infection may preponderate or dominate. Perhaps some of them are mutually repellant and a dominating form destroys a certain type. It is stoutly insisted by Schroeder and others that *Bacillus abortus* disappears from the genital tract soon after the close of pregnancy. Certain it is that most bacteriologists commonly fail to get cultures of *Bacillus abortus* from the uterine cavity comparatively early after the close of pregnancy. Bang also believed that pregnancy was a prerequisite

to the multiplication of *Bacillus abortus* in the uterine cavity. Whether these views are correct or not it is difficult at this time to judge finally. It may be that in quantity and virility the bacillus becomes impossible of cultural detection and yet persists. At least clinical experience indicates:

(1) The persistence in the uterus of *Bacillus abortus* or of some other organisms causing abortion, metritis and retained placenta in cows year in and year out. All recorded data show that cows which have suffered from abortion, retained afterbirth or metritis tend either to become sterile or to suffer again and again in succeeding pregnancies from the metritis of their first disaster.

(2) The recurrence of the metritis in severe form causing abortion, retained afterbirth, etc., is attributed to reinfection from the udder. Schroeder apparently was the first to suggest such a probability or possibility. Recent researches have shown abundantly the common and persistent invasion of the udder by *Bacillus abortus*, but it is difficult, if not impossible, to show directly and clearly that the bacillus migrated from the udder to the gravid uterus. It must be granted, however, that it is possible, and just as possible as is the infection of the pregnant uterus by the mouth or vagina. If *Bacillus abortus* can penetrate the undamaged alimentary or vaginal mucosa and thence reach the sealed utero-chorionic space through the blood stream, then it must with equal facility penetrate the lacteal mucosa. There is at present no reason to believe that other bacteria commonly occurring in the genital tract anterior to the vagina may not be able to reach the parts through the same avenues and at the same times as *Bacillus abortus*.

It appears to be satisfactorily shown that *Bacillus abortus*, once it has invaded the organs of a cow, tends to persist year after year apparently without end. While it is denied by Schroeder and others that it persists in the genital tract for a prolonged period, that is immaterial so long as the same investigators hold that it persists in the mammary gland and from that focus reinvades the gravid uterus. Schroeder, Buck and others have likewise shown that *Bacillus abortus* exists in long-standing lesions in the vesiculæ seminales and epididymes of bulls.

If *Bacillus abortus* can persist indefinitely, whether within the genital tract itself or in some other organ (mammary gland), and periodically reinvade the uterus, it is fair to conclude therefrom that other bacteria yet more commonly and abundantly found in the genital tract may have a similar history.

It is fairly safe to say that it is generally agreed that there are but two important and plausible natural avenues of infection of the uterus of the cow or other mammal. The one plausible direct avenue of infection is that resulting from copulation, the invasion occurring through the open cervical canal. In pregnancy this avenue is closed by the uterine seal. The one important and logical indirect avenue of infection is through the digestive mucosa.

Invasion through the vaginal mucosa seems highly improbable because, aside from copulation, there are few natural opportunities for contact. It is highly improbable that a nonmotile organism which is not known to multiply upon the surface of the skin would pass the vulva, come into contact with, and be absorbed by, the vaginal mucosa and thence reach the uterus with sufficient frequency to constitute a notable peril. The hypothesis that natural infection of the uterus via the vaginal mucosa is either frequent or important is not supported by recorded facts. The hypothesis, originated by Schroeder, that *Bacillus abortus* frequently invades the gravid uterus from the mammary gland has a degree of plausibility which is being heightened by research. The bacterium is common in the udder, and if it may invade the uterus by penetrating any mucous surface in the body there is no reason why it should not invade the blood stream from the udder. This may account, as Schroeder alleges, for some intra-uterine infections. In turn, the mammary gland may become infected through transmission from cow to cow by the milker. Other mammary infections are well known to be thus transmitted. But the suggestion of Schroeder that *Bacillus abortus* is transmitted from cow to cow by the milker fails to explain infections at the one supremely vital point. The most ruinous infections in large pedigreed herds occur in heifers in their first breeding year. These heifers have not been milked, their udders are not handled, and largely they have not been in contact, except as young calves, with milking cows nor with persons who milk cows.

The third indirect avenue of invasion is that through the alimentary mucosa. This avenue Bang urged as being of extreme importance. McFadyean and Stockman and others have emphasized Bang's conclusions upon this point.

More recently I have proposed an invasion through the same avenue at a wholly different era in the life of the animal. The claim of Bang and his supporters is that the invasion through the digestive mucosa occurs through the ingestion of *Bacillus abortus* by the pregnant animal. His belief that *Bacillus abortus* can invade

the uterus only when it contains a fetus, if proven, would be highly important in some respects but immaterial generally. If *Bacillus abortus* can invade the vesiculæ seminales of a bull and acquire a permament habitat there, it can invade a nonpregnant animal. It may find a habitat in the udder, and, as Carpenter has shown in one case, it may invade the udder of a heifer which has not conceived nor lactated. Its invasion of the dormant mammary gland which has never functioned indicates that there is no limitation as to how early such invasion may occur.

The udder having been invaded and the infection having acquired a habitat there, the secondary invasion of the gravid uterus may occur therefrom at any future date. But it is not essential that the habitat of an invader of the uterus shall be in the udder. If *Bacillus abortus* can invade the uterus from the digestive tract, there is no known reason why it may not persist in the alimentary canal. Practically all investigators recognize *Bacillus abortus* in the digestive tracts of aborts, where it has evidently lived and multiplied, and there is no known reason why, if it multiplies in the fetal intestinal tract and can be artificially grown in milk, it should not readily grow in the gastro-intestinal tract of a milk-fed calf and become a permanent dweller there. Such appears to be clearly true of that race of the colon bacillus commonly regarded as the chief or sole cause of calf scours. The bacillus lives in the uterus of the cow, in the digestive tract of the embryo and of the calf, and apparently in the digestive tract of the adult.

The researches of Hagan and Carpenter in collaboration with me have shown with perfect clearness the continuity of infection of the nongravid uterus, the gravid uterus, the fetus and the calf. It is satisfactorily clear that an infection within the utero-chorionic space penetrates the chorion and, reaching the amniotic fluid, is swallowed by the embryo. This holds with *Bacillus abortus*, the colon bacillus believed by Nocard, Moussu and others to cause abortion in cattle, the vibrio described by McFadyean and Stockman and by Theobald Smith as a cause of abortion in cattle, and by McFadyean and Stockman and by Carpenter as causing or associated with abortion in ewes. In other words, each and every microparasite discovered in the utero-chorionic space in the cow has also been recognized in the digestive tract of the fetus concerned, and, if it is born, the infection persists after birth. The opportunity for swallowing infection does not cease with birth. The milk commonly bears *Bacillus abortus*, and other bacteria also are present. Infec-

tion in large volume may reach the milk from the genital organs by extra-mammary contamination. When large quantities of virulent material are being expelled from the uterus, great care is essential if contamination of the milk is not to occur, and it must be admitted that any infection which, when swallowed by a fetus, endangers its life, must have an analagous danger when ingested by a new-born calf.

It is generally believed that abortion is largely caused by the taking of infection into the stomach of the pregnant female with her food. But the epithelium of the alimentary tract, if healthy, is intact and highly resistant to bacterial invasion. It is quite different with the new-born calf. It commonly has either diarrhea with profuse exfoliation of the digestive epithelium or it suffers from pneumonia with exfoliation of the respiratory epithelium. Without notable dysentery or pneumonia, a vast majority of dairy calves, where sterility and abortion are most severe, suffer from lesser disturbances of digestion. The hair becomes rough and dry, the feces adhere to the tail and buttocks, the calf is gaunt or pot-bellied, its growth is slow and vigor is lacking. The hairs about the urino-genital orifices of both sexes quickly become matted and stained black, to remain so throughout life. I have been led to believe that calves thus handicapped were greatly endangered by the invasion of chronic infections from the alimentary tract or from the lungs while the alimentary and pulmonary muscosæ were badly diseased or destroyed. This appeals to me as being far more plausible than invasion from the healthy digestive tract of an adult pregnant animal.

Probably the strongest objection to this view is the lapse of time between birth and breeding age. After a calf has reached 3 to 4 months of age, if it enjoys an ample food supply, it throws off the appearances of ill health, recovers its vigor, and from that time on, for 20 to 24 months, enjoys what is apparently the most healthy period of its life. Hence most persons refuse to believe that such an animal harbors an infection ready to cause disaster when pregnancy occurs. They must not forget, however, that not all such animals await pregnancy before showing disaster. In some groups of heifers each individual may conceive at the first copulation, but this is not always so. In large dairy herds where abortion, sterility and white scours are severe and continuous, many heifers require several or many copulations before pregnancy becomes established. Then if the total copulations required to accomplish fertilization

in the entire group which have conceived be divided by the number of heifers, the result will give a reliable prophecy of the rate of abortion, premature birth and metritis to ensue. That is, the more frequently a heifer must copulate, the greater the peril of her eventual conception. This can not be explained by exposure during pregnancy, but must be referred to the virgin period of her life. Not all heifers breed, however, and finally after prolonged efforts most pedigreed herds suffer losses of 5 to 10 per cent in permanently sterile heifers which have anatomically normal genital organs. Autopsy reveals infection in the cervix, uterus, oviducts and ovaries as the cause, and this must have been present prior to copulation or pregnancy would not have been prevented. These infections are frequently beyond correction. The vagina, cervix and uterus may be largely disinfected, but the ovaries and oviducts are well beyond the surgeon's reach. So in one heifer long under treatment and with blood strongly agglutinating *Bacillus abortus*, autopsy by Carpenter gave negative cultures from the cervix and uterus, streptococci from the oviducts, and *Bacillus abortus* from the mammary gland which had not functioned. Pregnancy was not essential to infection in either udder or oviduct, and the streptococcic or other infection must have been present at the first copulation to bar fertilization.

At this point theories clash. Most writers say that abortion is a chronic infection but fail to define "chronic." They then largely give to the disease characters not common to chronic infections, as I understand them, especially by attributing to the host the power of creating an unqualified immunity. From my viewpoint a chronic infection is one which is capable of existing indefinitely in a host without necessarily destroying its life or even causing recognizable disease. It may assume at any time a virulent course and render the host seriously or fatally ill. Or the host may gain a definite ascendancy and finally either apparently or actually recover. But the same infection may at any time reinfect the host, or while the infection is present superinfection may occur and add to the peril. Such a conception is in irreconcilable conflict with any idea of unqualified immunity. There is built up in some cases, it is true, a certain power of resistance to the destructiveness of the infection, but not sufficient frequently to eradicate it from the body or to prevent reinvasion in the future. Under such a conception if the infections which cause sterility or abortion in adults invade the newborn, there is no reason why they should not persist up to the

breeding time to interfere with reproduction. In our researches the blood of virgin heifers in severely infected herds not infrequently reacts strongly to the agglutination test for *Bacillus abortus*.

Schroeder and others assert that in the adults *Bacillus abortus* may and does live far longer in the organs of cattle than the time comprised between birth and breeding age. Jensen and other writers upon white scours of calves believe it due to an organism common in the intestinal tract of adult cattle but pathogenic for new-born calves only.

The theory of immunity held by many for *Bacillus abortus* would, if proven, render a reinvasion of the fetus or calf by that organism impossible, and, if the animal survives, the immunity would be of distinct economic importance, but clinically the reverse is true. The higher the rate of sterility and abortion amongst the adults of a herd, extending over a series of years, the lower the reproductive efficiency of heifers grown in the herd without special precautions.

Accurate clinical data, wholly free from objections, are exceedingly difficult to obtain regarding sterility, abortion and other bars to reproduction. These infections offer every imaginable variation and every possible opportunity for deception. Sterility, abortion and white scours suddenly loom up from no one knows where, and frequently abate without recognizable reason. If one attempts to cause sterility, abortion or white scours by experimental infection, he may appear wholly to succeed or he may utterly fail and in the end understand neither the success nor the failure. So with supposed cures or preventives. Bauer long ago believed that he controlled abortion by the use of carbolic acid, and no more convincing statistics of the control of abortion with drugs or biologics exists in veterinary literature than those he submitted; yet the veterinary profession at large knows that the alleged cure was a delusion. It is virtually impossible to get reliable statistical data from dairymen and cattle breeders. The ordinary breeder keeps no records, and the breeder of pedigreed cattle keeps to himself any records he may have except the official registration of calves born. It is not consistent with the interests of the breeder of pedigreed stock to publish his misfortunes. The less the public knows about diseases in his herd the higher price he can secure for any surplus stock.

There are, however, some fairly exact clinical data regarding the influence of the health of calves upon their reproductive efficiency as adults.

It may be stated with comparative safety that sterility and abortion during the first breeding year is most common in dairy cattle which are ordinarily fed artificially while young on cow's milk. They notably suffer, while young, from digestive disturbances in which life is endangered and in which the barrier to bacterial invasion constituted by the alimentary epithelium is critically injured.

In those animals which regularly nurse their young, sterility and abortion are no more common in the first than in later breeding years. In horses, sheep and swine, sterility and abortion are apparently not so common in the first as during later breeding years. In an outbreak of abortion in ewes, associated with a spirillum, studied in my department and reported by Carpenter, the storm broke during second pregnancy. There was no known opportunity for extrinsic infection between the successful first and the disastrous second pregnancy. Apparently it was due to a cumulative action of an infection present during the first breeding year but acquired explosive force in the second. Of course this may not be the true explanation, but so far as I have been able to find recorded, the observation is in accord with abortion in sheep generally, and is, I believe, in equal harmony with other species of animals which regularly obtain nourishment for a considerable time after birth direct from the mammæ of the mother by nursing. Such young animals, as a rule, suffer comparatively unimportant digestive disturbances.

A comparative study of reproductive efficiency during the first breeding year in those species of animals where some of the young are nursed by their mothers, and of others which are partly or wholly fed artificially, with resultant defective digestion, is highly interesting, however superficial the observations may be. Dairy calves are generally fed artificially and suffer severely from gastro-intestinal irritation, while common beef calves are usually nursed by their mothers and suffer but slightly from calf scours and pneumonia. According to available data, when the first breeding year is reached, heifers in large dairies, where calf scours and pneumonia have been rampant, conceive with difficulty, requiring an average of two to four copulations; 5 to 10 per cent are hopelessly sterile, and 20 to 30 per cent or more are observed to abort. The ratio of observed abortions in first and later pregnancies is about three or four in the former to one in the latter.

No recorded data regarding sterility and abortion during the first breeding year amongst common grade beef cattle are available,

but I doubt any challenge of the opinion that it is no more common nor even as common as in animals which have been previously bred. In large dairy herds sterility and abortion become what may be termed as fixed plagues of a grave character, the abortion involving preëminently the heifers, while sterility is most pernicious later. In beef cattle abortion appears now and then as a storm, involving alike all ages or preferably the older animals.

A further study apparently indicates that in large dairies the reproductive efficiency of heifers is profoundly modified by their health as calves. No wholly satisfactory standard for judging the health of calves has been established. The per cent of deaths from calf scours or pneumonia is a very crude and inadequate standard, just as the per cent of observed abortions is a very unreliable index of reproductive efficiency. The per cent of abortions in a herd is necessarily lowered by an increased prevalence of sterility; a sterile cow can not abort. Many animals also with infection in the utero-chorionic space calve at full term, so that metritis and retained afterbirth may be highly prevalent while the rate of observed abortion is low. In grade beef cattle, however, the symptoms of intestinal and pulmonary irritation, so universal in large dairies, are well-nigh absent in many herds, and in these abortion in heifers is infrequent.

According to my observations the general health of calves is reflected in their behavior at breeding age. As a rule the greater the size of a dairy herd the greater the difficulty from calf scours and pneumonia, and parallel thereto, the higher the rate of sterility and abortion in heifers. It is not rare, also, to observe absolute sterility in young bulls due to an infection within the genital organs. In a typical case a highly valuable young bull was absolutely sterile from the first, owing to abscessation of the epididymes. Had the epididymal infection been acquired after he had been placed in service, he should have been fertile in his first copulations. He may, of course, have become infected at any time, either as a fetus in utero or between birth and sex maturity, but the most logical era of invasion was during early calfhood when the resisting power of the alimentary-respiratory mucosa was low and the infection present was great and virulent.

In large dairy herds where sterility, abortion and calf scours and pneumonia are highly destructive, my observations indicate that vacillations in the health of the calves change profoundly the behavior of the heifers. In the Annual Report of the New York

State Veterinary College for 1915-1916, on page 125, a table is given showing the sterility-abortion rate in a group of heifers from Herd A. As calves these heifers were reared in a veritable pest-house; a dark, damp, fly-infested basement. They were fed carelessly from dirty pails, with mixed raw milk from intensely infected dams. The calves were in stalls with lattice partitions so that essentially they were in a common room. Feces and sputum could pass freely through the lattice-work. They suffered severely from white scours and pneumonia. This condition persisted for 6 to 8 years, and the heifers were observed to abort in their first pregnancies at a rate of approximately 50 per cent.

Then a change was made. The calves were given light, well-ventilated, individual stalls with tight board partitions. The feeding pails were kept fairly clean, and the feeding of the calves was given far greater attention. The calves grown under the new system have aborted in their pregnancies at a rate of approximately 8 per cent, or one-sixth as frequently as under the prior plan. So far as can be determined there has been no other change in environment. They occupy the same stables and pastures as heifers as those used by the earlier group. They are bred to analogous herd bulls, the bulls which are used on the adult cows.

On page 136 of the same Annual Report statistical data are inserted from Herd B, indicating in a very marked manner the effect of improved rearing of calves. The abortion rate of 44.1 per cent in the poorly reared calves dropped to 9.8 per cent in the better fed calves. Later the management of Herd B relaxed its efforts and the observed abortion rate rose, but not so high as in 1909-1912. For a second time the care of calves was improved and the abortion rate again fell, but before the results could be fully recorded the herd was dispersed and the observations closed.

Thus far my observations have constantly been that in herds where calves are unthrifty and suffer severely from white scours and pneumonia they breed poorly during their first breeding year. If gastro-intestinal disorders in the calf are mild the heifer is more prone to abort in her second than in her first pregnancy. My observations regarding the reproductive efficiency of swine have also proven highly interesting. They supplement the evidence presented regarding calves.

Several investigators have concluded that abortion in swine is identical with abortion in cattle. The *Bacillus abortus* of Bang is found in aborting cows and in the aborts. According to my observations,

when pedigreed swine are kept in conjunction with dairies and fed largely upon raw cow's milk the reproductive efficiency tends to decrease until finally they cease to be profitable. This is not true in large herds of swine, so far as I can learn, in which cow's milk does not constitute an important part of the diet. So far as I have been able to trace, abortion is not common in swine. Instead, the embryos perish in the uterus and become macerated.

Clinical observations upon one swine herd will serve to illustrate my meaning. On page 94 of the report of the New York State Veterinary College at Cornell University for 1917-1918 I have recorded the virulent degree of genital infections in a large Shorthorn herd, designated as Herd F. In conjunction with this herd there is kept a highly pedigreed herd of Berkshire swine. The foundation stock came from a highly fashionable swine herd kept in conjunction with a celebrated herd of pedigreed cattle.

The sows of Herd F nursed their pigs in the ordinary way, and as early as the pigs would take it an abundance of milk from the highly infected cows was added to their diet.

The reproductive efficiency was low from the beginning and gradually decreased until the herd was decidedly unprofitable. There was little abortion in the ordinary sense. There were many weak pigs which died, and along with pigs some dead cadavers were observed. Perhaps only a small portion of the dead cadavers were noticed, as the sow would tend to eat them at once with the fetal membranes. The greatest bar to reproduction was sterility. The blood of some of these agglutinated *Bacillus abortus* strongly. Agglutination with other bacteria was not tried.

In response to inquiry I advised the substitution of boiled for raw cow's milk for all ages of swine. This resulted in three groups of swine as related to the feeding upon raw cow's milk:

A. Sows fed throughout their lives on raw cow's milk.

B. Sows fed for a time upon raw and later upon boiled milk.

C. Sows bred upon the premises and in which all cow's milk fed was boiled.

The results, according to data furnished by the establishment, are as follows:

Results of Feeding Sows With Raw and Boiled Cow's Milk.

ITEMS	GROUP		
	A	B	C
Number of Sows	11	25	8
Breeding months in herd	131	438	92
Healthy pigs born	100	207	107
Weak pigs born	28	43	4
Cadavers expelled	5	39	2
Per cent healthy pigs	76.3	71.4	94.7
Per cent weak pigs	20.7	14.9	3.6
Per cent cadavers	3	13.7	1.7
Average months required to produce one healthy pig	1.28	2.11	.85

So far as can be determined, but one element has entered into the change in efficiency besides that of the preparation of the milk for feeding. About six months after changing from raw to boiled cow's milk there was a decrease in the rations allowed the sows and hence they were kept thinner in flesh. It can not be denied that this would affect favorably the result.

On the other hand, there are two facts which tend to negate any belief that the decreased ration to the sows caused the increased fertility or contributed largely thereto: (1) A number of sows in Group B had been highly fed and later the ration was decreased, but instead of their fertility advancing, it retrograded so that the last two sows of Group B to farrow produced one live pig. (2) A number of sows belonging to Group C were fed highly for a considerable time before the rations were decreased. At this point Groups B and C overlapped, and at the time the two sows from Group B, just mentioned, farrowed, 9 sows from Group C dropped 93 pigs, of which 81 lived. It therefore seems to me clear that the reproductive efficiency of the sows has been profoundly increased by a radical change in the feeding of the sow pigs.

Contributions by French veterinarians to the fund for the relief of French and Belgian members of the profession rendered destitute by the war have amounted to 77,856 francs. In reference to contributions from English veterinarians and from the American Veterinary Medical Association, Professor Vallée, chairman of the French committee, writes to a French veterinary journal as follows: "The very generous aid of our English and American confreres will awaken in the French veterinary profession a unanimous and cordial gratitude."

OBSERVATIONS ON AMYLOID DEGENERATION IN DOMESTICATED ANIMALS[1]

By HERBERT L. GILMAN, *Ithaca, N. Y.*

IN man, amyloid degeneration has been quite thoroughly worked out, particularly with reference to the changes found in syphilis, tuberculosis and other chronic diseases. In animals, however, as evidenced by the small amount of available literature in the English language, little has been done in this country on this subject. Foreign workers, on the other hand, have carried out extensive researches along this line, but unfortunately such literature is inaccessible to those who do not read foreign languages, except in so far as this work has been translated by others. In view of these facts an attempt was made to review the available literature on the subject, including recent researches, and to make observations on the changes produced in the various organs of the domesticated animals, with some reference to their relative frequency of occurrence. These observations were made over a period of a year on animals autopsied at the New York State Veterinary College, Cornell University.

Amyloid degeneration, according to Ziegler, is a peculiar degeneration of the connective tissue of the blood vessels, characterized by a deposit of an albuminous substance (amyloid) in the affected part, so that the tissue acquires a peculiar glassy, homogeneous appearance. Bailey refers to it as a homogeneous, solid, infiltrating substance, differentiated from substances closely allied by its peculiar staining reactions.

It is generally agreed that amyloid is not a true specific chemical compound, but consists principally of chondroitin-sulphuric acid, which is its most constant constituent, and a protein base which is somewhat variable in character. Jacob, however, states that recent chemical analyses have demonstrated several cases in which substances giving the reaction for amyloid did not contain this acid. Chondroitin-sulphuric acid is found normally in many different tissues such as cartilage, elastic tissue, especially of the aorta and ligamentum nuchæ, spleen, and the supporting tissue of many glandular organs, a fact which may account for the deposition of amyloid in so many tissues. He also suggests that under the action

[1] From Department of Pathology and Bacteriology, New York State Veterinary College, Cornell University.

of chronic bacterial toxins and other agents the protein derivative and other products of protein decomposition become unusually available, and by the interaction of a ferment, amyloid is formed. Bailey states that we have blood destruction, cell necrosis and fibrosis associated with amyloid, and that its deposition may be the result of destruction of cells, or both may be independent results of toxic action. Mallory believes that it is not a product of degeneration of cell or fibril, nor is it something filtered out of the bloodlike serum, but an abnormal product of the fibroblast. With this he calls to mind the normal occurrence of the chondroitin-sulphuric acid in so many tissues of the body.

Microscopically, amyloid is to be differentiated from several substances which resemble it to a greater or less extent. Among the more important of these might be mentioned the products of such degenerations as mucoid, colloid, elastoid and hyaline. The first has its special staining reactions and individual characteristics and is not very difficult to differentiate. Colloid, while taken by some to be a specific, definite substance, is used as a collective term by others, as Ziegler, who applies it to a great variety of formations that possess only certain physical attributes in common. He also quotes one author (Von Recklinghausen) who places mucus, amyloid and hyaline under this type. As a whole, it is not a definite chemical entity, and since its staining reactions do not differentiate it clearly from certain other hyaline substances, it seems best (Ziegler) to apply the term only to those hyaline products of epithelium which do not possess the characteristics of mucin.

Elastoid degeneration is a rather closely related process, consisting of a softening of the colloid material in elastic fibers which have lost their specific character and no longer react to the special stains. It is differentiated by the fact that it is found in the elastic fiber, stains faintly or irregularly, and remains of elastic fibers may often be found within it.

In the differentiation of hyaline from amyloid one frequently meets with much difficulty, especially in the newer deposits, and this question is the subject of much discussion. The term hyaline, though sometimes taken to mean a specific degeneration product, signifies rather an appearance simulated by a variety of substances. So in differentiating these two it would seem best to term as hyaline such substances which simulate amyloid but give negative reactions to its stains. Even then we have much difficulty, as the two substances seem to be closely related, there being no clear line of distinction

between the two. Both are found in the same places and have about the same microscopic appearance in sections stained by ordinary methods. Koltz and others regard amyloid as a changeable and unstable compound having a protein base very similar to hyaline. This view is supported by the fact that very frequently the homogeneous substances found take the stains for amyloid well, while in other cases the reaction is weaker and weaker, down to the true hyaline.

Bailey states that it seems to be the consensus of opinion that the iodine-sulphuric reaction is very frequently lacking, and that the aniline colors are more typical. In quoting Davidsohn and others he suggests that these reactions represent different stages in the development of amyloid, the reaction with aniline dyes appearing earliest and being present throughout, the iodine reaction appearing next, and that with iodine-sulphuric acid representing the last stage. Krakow, he states, lays the difference in staining not to a difference in chemical composition of the substance, but to a difference in the physical conformation of the older deposits.

According to Zeigler, we have as a result of this amyloid deposit or formation, on the one hand, a change in structure, and on the other hand a degeneration and disappearance of the cellular elements. The connective tissue is permanently changed, as the practically insoluble amyloid is never removed. The tissue is thickened, and when associated with blood vessels gives thickened walls, diminution in size and obliteration of the lumina together with a disturbance of the circulation and an atrophy of the neighboring parts. Many references are made to the frequent appearance of fat in or about amyloid deposits, occurring either independently or as a result of it. Koltz states that in regions of early amyloid deposits a deposit of fat can not be found, but as the deposit increases there is a saturation of the amyloid material with fat either diffusely or in work-like masses. Its (fat) origin has not been determined, but probably comes from the tissue fluids, or from liberation from degenerating cells in neighboring parts. However, the specific staining reactions are in no way interferred with, and the fat may be dissolved out by the ordinary solvents, showing that it is in a physical rather than a chemical combination.

Hutyra and Marek state that the degeneration occurs mostly in horses, and quote the following authors as to the occurrence of it in the domesticated animals. Bohl found it in 4 per cent of the horses autopsied. Joer, Pflug, Toerster, Panlicky and Hiccback have

referred to its infrequent occurrence in animals. Rabe showed it in 50 per cent of all cases of chronic pleurisy and peritonitis. It has been observed in dogs by Rabe, Rivolta, Kitt and Dorflinger, and in the cat by Mathis. Burnett states that it does not occur as frequently in animals as in man.

Many causative factors are mentioned, among which are protracted and exhausting diseases, prolonged suppuration, long-continued irritation by bacterial toxins, pleurisy and peritonitis of long duration, carcinoma (Rabe), tuberculosis and chronic nephritis (Bruckmuller), and lymphangioitis (Reis). Burnett describes it as occurring mostly after some chronic suppuration but not after every suppuration. In man it is frequently the result of syphilis and chronic dysentery. To these might be added senility and unknown causes, especially in man. Experimentally, according to Hutyra and Marek, Krakow produced the degeneration in dogs, rabbits, chickens and pigeons by the repeated subcutaneous injection of cultures of *Staphylacoccus pyogenes aureus*, while culture extracts of the same bacterium failed to produce this result. It was produced by systematic injections of toxins of *Bacterium pyogenes*. Similar experimental results were obtained by Maximow in rabbits and chickens, by Davidsohn in rabbits, guinea pigs, mice and chickens, and by Ravenna in white rats. Lubarsch produced it in dogs in four weeks and in rabbits in three to four weeks by systematic injections of turpentine and by the suppuration so produced. Similarly Schlepilewsky succeeded more recently with enzymes.

Bailey, in more recent researches, succeeded in producing a general amyloidosis in 8 rabbits by injecting living cultures of *Bacillus coli communior* over 88 days. Eight showed lesions in the spleen, 6 in the kidneys and 3 in the liver. In practically every case suppuration was absent and therefore not a factor in the production of the condition. This overcomes the principal objection to producing amyloid by the injection of turpentine, toxins (bacterial) and ferments, in that it is almost impossible to make many injections without bacterial infection with subsequent suppuration. This objection is quite justified, however, as in much of the experimental work the condition is undoubtedly caused by the suppuration following infection at the time of these injections, more than by the substance injected.

Among the more important special stains or "microchemical reactions" might be mentioned the reactions with iodine-sulphuric acid, methyl violet, methyl green, polychrome methylene blue, and

Mallory's connective-tissue stain. In the iodine-sulphuric acid reaction the section is treated with Lugol's solution a few minutes, washed, placed in 1 per cent sulphuric acid, and then washed again. Amyloid should be blue, green or violet, other tissues being unchanged. In this reaction with iodine we must guard against other substances which become blue or violet with iodine, such as starch, certain bacteria, cellulose, and cholesterin crystals especially after standing a short time. Most investigators have had a great deal of difficulty with this reaction, claiming that it is uncertain or entirely lacking in some cases. Neuman, however, believes that unsatisfactory results here are due entirely to faulty technique on the part of modern investigators, stating that the methods advised in many recent text-books differ materially from that employed by the original discoverers. He further states that the iodine solution should be diluted, probably to the color of Rhine wine, and the tissues should remain in it just long enough to give them a slightly yellowish color; if stronger solutions are employed the tissue becomes overstained and the acid will produce a brown to black color. The specimen should then be mounted, a cover glass placed over it, and lastly a small drop of concentrated sulphuric acid permitted to run along the side. This, he says, will always produce a beautiful blue or violet stain of amyloid.

The methyl violet reaction is about the same, except that 1 per cent aqueous solution of methyl violet is used in place of Lugol's solution, and glacial acetic acid instead of sulphuric, followed by mounting in potassium acetate solution. Amyloid should be deep red, nuclei dark blue, and other tissues greenish blue.

Methyl green differs in no way from the one just mentioned other than in using a 1 per cent aqueous solution of methyl green. The polychrome methylene-blue reaction is somewhat more complicated and so will not be taken up here. Mallory's connective-tissue stain merely picks out the normal connective tissue fibers, leaving the diseased fibers poorly stained or not stained at all.

Besides the form of amyloid degeneration considered as a disease, usually affecting several organs, or, if only one organ is affected, we get diffuse changes of the whole organ, there is a localized form of amyloid deposit as localized infiltrations or free concretions. Local amyloid deposits are found in tissues affected with chronic inflammatory processes, chronic ulcerations, tumors undergoing retrograde changes, etc. It is usually found deposited in the ground substances, though one author (Rählmann) claims that the

cells of the tissue may acquire a hyaline appearance and give the amyloid reactions. We also find the substance in places not connected with inflammation. Corpora amylacea or free amyloid bodies are small lamellated irregularly shaped bodies found in parts of the central nervous system, lungs, mammary gland, prostate, etc. Ziegler states that the local deposits of amyloid and free amyloid concretions can not be regarded as being of the same nature as the progressive degeneration of connective tissue, as not all of them give the amyloid reaction. They are dependent upon local conditions for their origin, and consist in many cases of modified epithelial hyaline and connective tissue, as well as masses of degenerated cells.

A routine examination was made of certain organs of all animals examined at the postmortems held at the New York State Veterinary College, Cornell University, during a period of one year. The animals were principally cattle and horses, but other species were occasionally examined. In the observations but little attention was given to the macroscopic appearance of the affected organs or tissues, inasmuch as a positive diagnosis is impossible by that method, due to the quite similar appearance of closely related substances. Macroscopic changes appeared to be rather rare, however, in view of the fact that they were seen in but few cases, and then only over small areas.

Most of the sections were examined in the fresh state by means of the freezing microtome, while others were fixed and imbedded in paraffin. Sections made in the latter manner brought out the changes more clearly, and a more careful examination could be made, but time was not available for this procedure. By the freezing method, however, one could, by careful technique, make fairly good sections within a few minutes, and with fairly satisfactory results. Some organs, such as the spleen, had a tendency to fall apart, and in such cases the paraffine method was used.

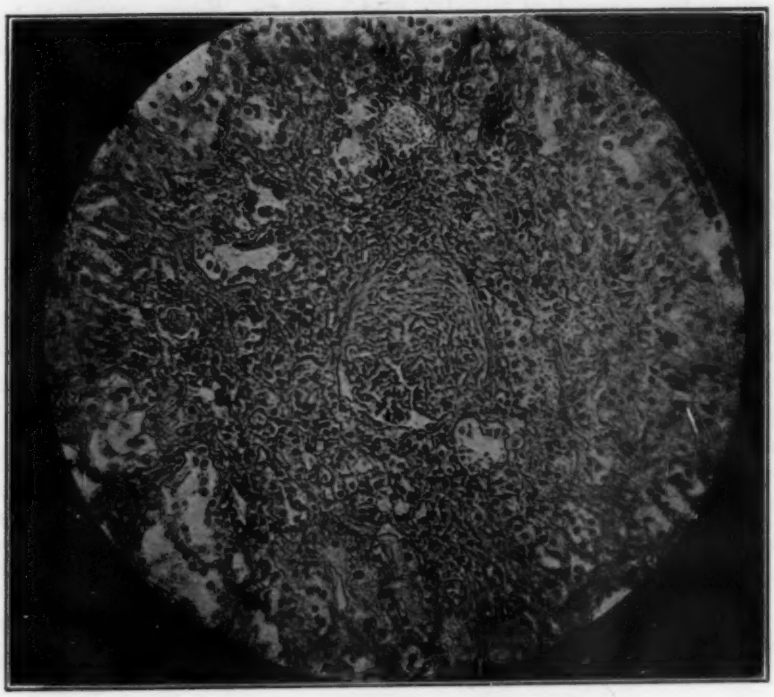
The iodine-sulphuric acid reaction was attempted at first, but with rather variable results, inasmuch as some tissues would fail to react to the iodine and still give a good coloration with the aniline stains. At other times the normal tissues would have a tendency to take the iodine coloration, which led to more or less confusion and indefinite results. Neuman's technique for this reaction was not learned till most of the observations were made, so this method was not tried except in a few cases. In these few cases results were much more gratifying than by the ordinary methods. The test most

extensively used and which gave the most satisfactory results was that in which the sections were stained with a 1 per cent solution of methyl violet in 3 per cent glacial acetic acid, followed by washing with distilled water and mounting in glycerin. Results by this method were very satisfactory.

Colloid and elastoid degenerations were seen in but few cases, leaving the differentiation mainly between hyaline and amyloid. Even here results were somewhat variable, but this was to be expected in view of the close relation between the two substances in physical appearance and chemical composition. Both were frequently seen in about the same places, and in many cases the stains failed to give a distinct differentiation. The older amyloid deposits gave a very bright violet red coloration, but in the younger and smaller deposits numerous gradations in the intensity of staining were observed, varying from the intense violet red down to the faint pink color bordering on the negative reaction characteristic of substances of a true hyaline nature. All of these stages, the fully developed amyloid, young deposits and hyaline, were seen in a few cases in the same organ. This lack of a sharp distinction in staining reactions, together with the fact that lately amyloid substances have been found which did not contain the characteristic chondroitin-sulphuric acid, tend to strengthen the belief that the two substances are very closely related, amyloid being but a later stage of hyaline.

This gradation in the intensity of staining was observed quite clearly in the case of corpora amylacea found in the mammary gland of a cow. It is unfortunate in this case that no history of the animal could be obtained nor an examination be made of the other organs for a general condition of amyloidosis. In sections there was a marked degeneration of the parenchyma and interstitial tissue with amyloid degeneration of the smaller blood vessels as thick homogeneous bands of infiltration beneath the endothelium. In the acini were numerous small irregularly shaped lamellated corpora amylacea, which stained rather unevenly. In the center the coloration was quite dark, but toward the periphery the layers became progressively lighter in color, the outer one being a faint pinkish color. Here it would seem that the body consisted of a single substance made up of layers, the more central or older deposits taking the stain more deeply than the peripheral or newer deposits. Herz found these bodies quite frequently in the examination of milk and dairy products for starch derivatives. Both gave

Corpora Amylacea, Mammary Gland



Amyloid Degeneration, Kidney

the bluish color with iodine, but the amyloid bodies did not give such a diffuse coloration, for they did not clump together as did the starch granules.

A particularly interesting case was noted in an old St. Bernard dog with a history of edema of the chest and legs together with general symptoms of dullness, depression and anorexia. The heart was very fast and pounding, pulse fast and almost imperceptible, blood pressure very high. The most striking lesion was in the tricuspid valve of the heart, which was much thickened and presented a peculiar gelatinous appearance. On microscopical examination the connective tissue was much increased in amount, calcification was present in areas, and in one place the tissue was taking on an osteoid appearance. Numerous areas of homogeneous material giving the test for amyloid were noted infiltrating the much-increased connective tissue. Associated with this was a certain amount of fatty degeneration. Several of the smaller blood vessels showed band-like infiltrations of amyloid. Examinations of liver, kidneys, spleen and aorta failed to give evidence of a general condition of amyloidosis.

In the sections of livers examined the condition appeared in scattered areas, affecting both the interlobular connective tissue as well as that associated with the blood vessels. When present in the interlobular connective tissue it appeared as spindle-shaped infiltrations between the connective tissue fibers and was limited mostly to those lobules the blood vessels of which were also affected. A few of the interlobular vessels showed infiltrations under the endothelium, either as complete bands, or separated areas of crescent shape, or lumpy masses of the homogeneous, shining substance. The capillaries within the lobules were sometimes affected merely by a slight thickening under the endothelium, while in other cases the vessels were so thickened as almost to cause obliteration of the lumina. Here too the material was laid down either in thick bands or broken masses. As a result the liver cells were in some cases but slightly compressed, while in others there was partial or complete atrophy, leaving the lobule made up of worklike masses of the substance with occasional remains of the atrophic parenchymatous cells. The afferent blood vessels were affected in some cases, but the tendency always seemed for the condition to start at the periphery of the lobule and work toward the center.

In the kidney the capillaries of the glomeruli were most often affected. Here it was manifested in the same manner, by the thick-

ened homogeneous infiltrations beneath the endothelium, with the resulting partial or complete obliteration of the lumina. But few vessels may be affected, or the glomerulus may appear to be composed entirely of worklike masses. Other vessels in the organ often are affected and associated with this; one frequently finds hyaline casts in the tubules.

In the spleen the condition was confined to the smaller vessels of the Malpighian corpuscles and in a few cases to the connective tissue of the trabeculæ. One very interesting section from a cat was seen, in which the trabeculæ were very much thickened by a quite diffuse infiltration with marked degeneration and atrophy of the connective tissue.

In the lymph glands the condition was limited to the smaller vessels of the lymph nodes. Some of the smaller vessels were affected in one of the sections of intestine examined.

In another instance the wall of a bladder was very markedly thickened, showing on macroscopical examination a peculiar gelatinous appearance. On section it proved to be a very good example of amyloid affecting connective tissue other than that associated with blood vessels. There was a marked degeneration of the tissue cells, and thick spindle-shaped infiltrations of amyloid in between the compressed and atrophic connective tissue were found.

In general:

1. The condition appeared on microscopical examination to be about the same in animals as in man, though rarely appearing so diffuse as to be seen by macroscopic examination. This may be due to the fact that animals suffering from any chronic disease are either cured or destroyed within a short time, and that comparatively few animals live to old age.

2. In several cases the condition was observed affecting connective tissue other than that associated with blood vessels.

3. Sufficient material was not available to make a statement as to the relative frequency of occurrence, but it would seem that the condition is fairly common though affecting only small areas in the various organs.

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Professor Bimes, of the Veterinary School of Toulouse, France, has received the title of Chevalier of the Legion of Honor in recognition of his thirty years of distinguished service.

Dr. F. H. Barr, of Albuquerque, N. M., has been appointed Resident Secretary, to succeed Dr. M. W. Miller.

Dr. E. T. Harrington, 873 Broadway, Boston, Mass., has been appointed Resident Secretary of that State, to succeed the late Dr. Winchester.

Dr. J. B. Bushong has resigned his position with the Cutter Laboratory and has become City Veterinarian and Chief Milk Inspector for the city of Los Angeles.

Dr. Seymour Hadwen has resigned his position as chief pathologist in charge of the Biological Laboratory, Health of Animals branch, Canadian Department of Agriculture, Ottawa, Canada, and has taken a position as chief pathologist in the Reindeer Investigations of the Bureau of Biological Survey, U. S. Department of Agriculture. His headquarters and post-office address after July 1, 1920, will be Unalakleet, Alaska.

Dr. Ivan Isaacson, for several years engaged in serum production work at the Lederle Antitoxin Laboratories, has resigned and is at present associated with Dr. M. G. Wohl at the Laboratory of Clinical Pathology, Omaha, Nebr.

IMPORTANCE OF PREPAREDNESS IN MEETING FUTURE OUTBREAKS OF FOOT-AND-MOUTH DISEASE[1]

By JOHN R. MOHLER, *Washington, D. C.*

SUDDENLY and unexpectedly three outbreaks of foot-and-mouth disease have appeared in this country within my experience. The sources of the infection in the first two were definitely determined, but the origin of the 1914 outbreak remains a mystery. The 1902 and 1908 outbreaks were confined within narrow limits in Eastern States where the animal population was comparatively sparse and other conditions also were favorable for successfully combating a contagious disease. Each of these outbreaks was eradicated within five months at an approximate cost of $300,000.

The 1914 outbreak was the most extensive of any that has yet visited this country. In this instance the infection gained access to the Chicago stock yards, our largest live-stock market, and within thirty days it was transported to the Atlantic and Pacific coasts. An alarming feature was the appearance of the disease on ranches in the open-range country of Montana. In all, twenty-two States and the District of Columbia were invaded in rapid succession, and the prospects of successfully combating this outbreak were discouraging. Although it cost the National Government and the States approximately $9,000,000 to exterminate the outbreak of 1914-15, we were fortunate in being able to prevent the disease from gaining a permanent foothold in this country.

It is notable that these previous outbreaks have occurred at the same season of the year, with an interval of about six years between them; so if history repeats itself we are due for another outbreak in the fall of 1920. However, the occurrence of previous outbreaks at regular intervals is regarded as merely a coincidence, and we may expect another at any time. The history of this dreaded animal plague in foreign countries is built of recurrences. With the disease present in most of the countries with which we cultivate commercial relations, and with the resumption and extension of our foreign trade following the war, our danger of another visitation is increasing. England has had forty-nine herds to develop the disease in the last forty-three weeks, due chiefly, it is said, to the return

[1] Paper presented at the fifty-sixth annual meeting of the American Veterinary Medical Association, New Orleans, La., November, 1919.

of soldiers from infected France. In Southern France and Italy the infection has been reported in epizootic form, and the same is true in certain South American countries. Although every reasonable precaution is being employed to prevent another invasion, it is realized that it is practically impossible to preclude all possibility of danger and at the same time preserve our foreign commercial relations; therefore it becomes necessary for us to be on the alert promptly to detect the first appearance of the disease and to make preparations to eradicate outbreaks as soon as possible when they occur.

PREPARATIONS BY THE BUREAU OF ANIMAL INDUSTRY

Veterinarians representing the Bureau of Animal Industry have been stationed in Great Britain continuously since July, 1890, to guard our interests in connection with the live-stock traffic carried on between this country and Europe.

To guard more effectually against the introduction of harmful animal diseases from abroad, including foot-and-mouth disease, the regulations covering the importation of animal products were revised, effective January 1, 1917.

After the discovery that foot-and-mouth disease was introduced in this country in 1908 through the importation of contaminated smallpox vaccine, a law was passed by the Congress and approved March 4, 1913, governing the importation of viruses, serums, toxins and analogous products intended for use in the treatment of animals.

Immediately after the outbreak of 1914-15 the Bureau directed its attention to imported animal products from South America as a possible source of infection. In order to obtain the facts, one of the most competent veterinary inspectors in the Bureau was detailed indefinitely to South America to investigate and report to the Chief of the Bureau on the extent and spread of animal diseases in that continent, the methods of control and eradication employed, the efficiency of the antemortem and postmortem inspection of animals the products of which are intended for export to the United States, and to keep the Bureau informed concerning all matters of interest in order that further action might be taken if necessary to protect our country as far as possible against the invasion of foot-and-mouth disease from that source. At present there are two representatives of the Department of Agriculture in South America studying live-stock matters.

In November, 1916, the Veterinary Director General of Canada

reported that he was in receipt of information from official sources in England that agents of the German Government were making attempts in Switzerland to enlist the services of Swiss farmer emigrants to spread foot-and-mouth disease in Canada, and that they would probably enter Canada through the United States. On receipt of this information arrangements were promptly made with the United States Secret Service, the State Department, the Treasury Department, the Bureau of Immigration and the United States Public Health Service for a careful examination of baggage and clothing and a rigid interrogation of all emigrants from suspicious sources. In addition a record of each immigrant, as recorded in the manifest, was forwarded to the Bureau of Animal Industry at Washington, and many of these immigrants were traced to their destination and their movements watched.

In November, 1915, a book, "Instructions for Employes Engaged in eradicating Foot-and Mouth Disease," was issued and distributed to Bureau and State officials throughout the country. A supply of copies is held in reserve ready for immediate use in case of further need.

In January, 1917, the Committee on Live-Stock Sanitary Affairs of the Bureau was called together to review the history of the 1914-15 outbreak and to confer with the various States in formulating a definite plan of action to be pursued in case of future outbreaks. On January 16, 1917, a letter was addressed to the proper officials of each State informing them that the Department desired to formulate some definite plan of action to be followed promptly and effectively in coöperation with the various States in the event of another outbreak, and requesting information as to their powers and resources to coöperate with the Bureau.

This letter was followed by another in May, submitting for the consideration of the State authorities a tentative plan of action and requesting a statement in reply as to whether or not they were prepared to coöperate promptly with the Bureau in carrying it into effect if approved. The main features of this plan are the application of quarantine, slaughter of affected herds, subsequent cleaning and disinfection of infected premises, and sharing of expenses equally between the State and National Governments.

It was suggested that in order effectively to carry out the proposed plan the State laws should provide for—

1. A live-stock sanitary board or other executive head with a wide range of power to promulgate regulations without delay to meet

conditions as they arise and act independently on matters of detail. The regulations should be in conformity with Federal regulations.

2. An adequate emergency fund immediately available, or authority for the Governor to issue interest-bearing certificates of indebtedness, for meeting promptly all expenses incurred in connection with eradication work, including the payment for animals and other property destroyed.

3. Coöperation with the United States Department of Agriculture in controlling and eradicating contagious diseases of animals, especially foot-and-mouth disease.

4. A State veterinary organization consisting of not less than one representative in each county of the State.

5. Veterinary practitioners to report immediately to the proper authorities all cases of foot-and-mouth disease that come to their attention.

6. The sterilization of public creamery by-products before they are returned to the farm.

7. Authority lodged with the live-stock sanitary board or other executive head to establish quarantine of infected herds, exposed herds and as much territory within the State as is deemed advisable.

8. Authority for entry and destruction of animals and property.

9. The appointment of an appraiser or appraisers.

10. The fixing of a just maximum valuation for grade and pure-bred registered animals in affected herds.

11. Penalties for violation of the law and regulations.

The proposed plan was unanimously approved by the State officers, but the replies showed that ten of the forty-eight States had no authority under their laws to coöperate with the National Government in the eradication of foot-and-mouth disease. Only six States had adequate funds available to begin effective eradication work should an outbreak have occurred at that time. Two States had less than $5,000, and seventeen had amounts ranging from $5,000 to $50,000. The largest sum that any State specified as available was $250,000, but two reported that they had as much available as was necessary. Sixteen of the States had no laws or regulations authorizing the condemnation and appraisal of animals and materials destroyed or for the payment of such expenses. In two States the laws gave authority to pay only for animals slaughtered on account of the disease and not for materials destroyed in connection with the cleaning and disinfection of infected premises.

It was evident from the replies that 80 per cent of the States

were in need of additional laws and 87 per cent had insufficient funds or no funds to begin effective foot-and-mouth disease eradication work. Under such conditions many of the States, and likewise the Bureau, would be seriously handicapped in carrying out any effective coöperative plan of action in eradicating foot-and-mouth disease.

Ever since the outbreak of 1902 the Department has endeavored to impress upon the various States the importance of preparation to meet promptly and effectually outbreaks of foot-and-mouth disease. This matter was particularly emphasized at the meetings of the United States Live Stock Sanitary Association in 1914, 1915, 1916 and 1917, and in correspondence since that time. The States and the Department of Agriculture have had five years since the beginning of the last outbreak in which to prepare for the next.

So far as the Bureau of Animal Industry is concerned, it is believed that it has never been so well organized and equipped to combat promptly and effectively an outbreak of foot-and-mouth disease. The Bureau has in its employ 4,673 persons of whom about 1,550 are veterinarians. A survey of the field force shows that at this time there are 1,408 veterinary inspectors of the Bureau engaged in different lines of field work in the forty-eight States. These veterinary inspectors are distributed as follows:

Hog Cholera Control:
140 veterinary inspectors working in 34 States.
Tuberculosis Eradication:
158 veterinary inspectors working in 43 States.
Tick Eradication:
154 veterinary inspectors working in 10 States.
Field Inspection (scabies, anthrax, dourine, stockyards inspection):
117 veterinary inspectors working in 36 States.
Virus-Serum Control:
57 veterinary inspectors working in 12 States.
Quarantine Inspection:
32 veterinary inspectors working in 9 States.
Meat Inspection:
750 veterinary inspectors working in 46 States (128 cities).

1,408 Total.

In addition to the veterinarians, there are lay inspectors in the meat and field inspection service and experienced employes of the

Dairy and Animal Husbandry Divisions of the Bureau stationed at various points in different States, and in emergency much valuable assistance could be rendered by employes of the extension divisions of agricultural collges. At the present time 160 representatives of the Animal Husbandry Division are stationed in 48 States and 120 representatives of the Dairy Division are conducting operations in 40 States.

The Bureau has not only instructed its employes in regard to the methods of procedure, but in addition it has selected certain experienced individuals to fill assignments in the various lines of eradication work in the event of another outbreak. The names of these men with their assignments are on file in the Bureau office at Washington, so that within an hour after a positive diagnosis of foot-and-mouth disease, instructions could be telegraphed and each man would know his place and duties in the field organization. The States have been urged to make similar preparations so as to avoid delay when the time arrives to begin operations.

Any policy adopted for the extermination of a contagious disease should have the support of the live-stock and allied industries. It has been the policy of the Department to combat outbreaks of foot-and-mouth disease through the application of quarantine, the slaughter of affected and exposed animals and the cleaning and disinfection of infected premises, because this is believed to be the quickest, safest and most economical method. These drastic measures have proved successful in this and other countries, while less drastic methods have been unsuccessful in eliminating the disease from other infected countries.

In order to obtain the views of persons interested in live-stock matters relative to the policy to be pursued in the future, the following letter was addressed recently to live-stock and dairy organizations, live-stock sanitary authorities, live-stock, dairy and farm papers, live-stock exchanges, professors of animal husbandry connected with State agricultural colleges, and many prominent live-stock men.

"September 22, 1919.

"Dear Sir:

"I am writing to you with the hope of obtaining a frank expression of your views relative to the policy that should be pursued in the event of a future outbreak of foot-and-mouth disease in this country.

"It is well known that the Bureau has always looked with favor upon the prompt slaughter of all affected and exposed animals in connection with the application of appropriate quarantine and

disinfection measures. In combating past outbreaks it has pursued this policy because it believes that method to be the quickest, safest, most economical way, and serves best the interests of the greatest number engaged in live-stock pursuits and allied industries. Our preference for that policy is based upon our knowledge of the nature of the disease and the experiences of different countries in handling outbreaks. In this country the slaughter method has always proved successful and it has received the hearty support of the coöperating State authorities and the live-stock industry in general.

"After the conclusion of the work of stamping out the last outbreak, a committee was appointed in the Bureau to review the entire experiences of that outbreak and prepare plans for meeting future invasions of the disease. The proposed plans were submitted by the Secretary of Agriculture to the live-stock regulatory authorities in every State for approval, with the recommendation that prompt action be taken to prepare to carry them into effect in case of emergency, and suggestions were made as to what such an emergency would require on the part of each State. Congress, at the request of the Secretary, appropriated the sum of $1,000,000 as an emergency fund, to be available should the disease again appear in this country. The Bureau is organized to combat another outbreak; it is carefully investigating every case coming to its attention which shows suspicious symptoms, to make sure that the disease does not get a foothold before it is discovered, and every possible means are being employed to prevent an invasion from abroad.

"At the time of the last outbreak live-stock men were generally of the opinion that this disease must be stamped out, and that regardless of sacrifices and costs it must not be given a possible chance to become permanently established in the United States. It was universally conceded that all affected common and grade animals should be slaughtered promptly, but some have suggested the advisability in the future of attempting to save some purebred animals, and cited the National Dairy Show herd as an example of the possibilities in this line of conservation.

"Of course the Bureau could consider saving such animals only where the conditions for isolation are ideal as they were in the case of the National Dairy Show herd. Then in such instances it would be necessary to impose equally rigid requirements, including the maintenance of guards, the proper disposition of products, prolonged quarantine, slaughter of chronic cases, and finally transfer of the animals after disinfection to other clean quarters for final tests with contact animals before release. We could not afford to relax any from the precautions exercised with the National Dairy Show animals, and it would be absolutely necessary to adopt practically the same procedure in similar instances.

"To undertake to save animals of unusual value must necessarily increase the difficulty of eradicating the disease. The Bureau has no arbitrary policy in the matter and its only wish is to serve the

live-stock industry most effectively. If such service is performed by the adoption of the surest methods of eradication in the shortest possible time, then in the light of our present information the course that must be followed is to slaughter all affected and exposed animals as promptly as possible. If on the contrary it is the judgment of the majority of the State authorities and live-stock owners that the best service can be rendered in attempting to save some of the most valuable animals even if the time and expense of eradication are increased, the Bureau is willing to consider it; but in the circumstances it would hesitate to deviate from its tried methods without first having an expression from those who are also keenly interested in this important matter.

"Experience has shown that a rigid quarantine prolonged a sufficient time is more expensive than when the animals are slaughtered. No doubt the principal reason for the failure of the 'quarantine and treatment' method is the difficulty of maintaining an effective quarantine. With the aid of the military forces European countries were unable to effect such a quarantine. Would it be possible, therefore, to maintain on farms in this country for months a quarantine that would be sure to prevent the movement from quarantined premises of anything that might carry the infection? This Bureau believes not. A long quarantine is sure to be less effective than a short one.

"The only animals that might be considered of sufficient value to undertake to save are those that are contributing something to their breeds that would be lost should they be destroyed. Any pure-bred animal of decided merit is useful to its breed in that it aids in increasing the number of good animals, but unless it is contributing something unusual this loss is not irreparable to the breed as a whole. There are animals, however, which if destroyed would result in the loss of something that would require years to restore. In view of the risks involved, should an effort be made to save even such animals? If so, when and how shall the line be drawn? Who shall receive the benefits, if there are any, of such an advantage? Should the live-stock industry as a whole be penalized by prolonged State and foreign quarantines in order to protect the interests of a few individuals? Would it pay in the end?

"It is impossible to determine the cost of this disease to the countries where it has become permanently planted. We know, however, that the continued presence of the infection imposes a tremendous burden upon live-stock production and agriculture in general. It cost the National Government approximately $300,000 each to eradicate the 1902 and 1908 outbreaks, and to eradicate the outbreak of 1914-15 it cost approximately $4,600,000. The States' share was 30 per cent in the 1902 outbreak, 33 1-3 per cent in the 1908 outbreak, and 50 per cent in the last outbreak. The total cost to the National Government and the States to eradicate the three outbreaks is a small sum compared to the direct and indirect losses that no doubt would have resulted through damages to stock, inter-

ruption of commerce, exclusion from domestic markets and destruction of foreign trade through the operation of State and foreign quarantine, had our efforts to eradicate the disease proved unsuccessful.

"Our country is free from the plague and our interstate and foreign commerce is unhampered by any quarantines on account of foot-and-mouth disease. We have succeeded in every instance where we have attempted to eradicate an outbreak by the methods we have employed, while the foreign nations have failed when they have resorted to the less drastic policy of 'quarantine and treatment.' The live-stock industry is confronted by the question, 'In the future shall we deviate from our former successful methods by attempting to save any purebred animals?'

"Your careful consideration of this matter and your frank suggestions on this and all matters relating to the future policy for handling an outbreak of the disease in this country, are earnestly desired. Very truly yours,

"J. R. MOHLER, *Chief of Bureau.*"

Since September 22 the Bureau has sent out 368 of these letters. By far the largest number of the replies received to date favor the policy that has been pursued so successfully in combating outbreaks of the disease in this country. Next in order, but decidedly less in number, come those who believe that an attempt should be made to save by stringent isolation and quarantine only purebred sires of exceptional and unusual merit. Some would carry out the policy that has been pursued in the past except in such unusual cases where large numbers of valuable animals are assembled as in the case of the National Dairy Show herd, and a few others are of opinion that efforts should be made to save both male and female registered animals of exceptional breeding value on farms.

It is hoped that this letter, besides bringing out expressions of the views of representative men, will strengthen sentiment in favor of a vigorous and effective method of eradication in case of future outbreaks.

Rural World and Western Empire (June 12) says of the better-sires campaign's total of 990 owners of 63,628 farm animals: "This is a very good showing, but it must be realized that the campaign has been of tremendous educational significance, and its value is not to be measured by these figures alone. In fact, we would say that the value of this campaign has been really immeasurable to the agricultural interests and to the country at large." Also to veterinarians.—ED.

THE ANIMAL ENGINEER[1]

By WILLIAM HEBRERT LOWE, *Paterson, N. J.*

DID you ever stop to think how limited some people's vision is respecting the more important things of life? There are those who do not believe in God or in man further than their own individual interests are concerned. There are those who believe that the displacement of the horse by the automobile and auto truck means the end of a noble profession; so it may be well for us at this time briefly to consider some of the problems of the profession, for I feel we should use our best endeavors to enlighten the public as to the character and scope of the work of the veterinarian.

Economic considerations will always insure the employment of the skilful practitioner in the treatment of the accidents and ailments of domestic animals, and humane sentiment will prompt the calling of the veterinary practitioner for the alleviation of the suffering of our animal pets. The repair of the animal machine so that it can function again and perform the work required of it is in itself of inestimable value in relieving suffering and in the saving and the restoration of valuable property.

I desire today, however, to speak more particularly of some of the problems of preventive medicine in the protection of our flocks and herds from infection and infestation and also of the desirability of the development of a better animal husbandry than the world has yet seen, that will provide clothing and human food more abundantly and more economically without imperiling public health.

In a number of striking instances this country has had the benefit of an intelligent application of the principles of veterinary science demonstrated in the control and eradication of infectious and contagious diseases over wide areas that would have practically ruined the live-stock industry if our science had failed when put to the crucial test, but it did not fail and it will never fail so long as men of ability having the natural aptitude are thoroughly educated in the fundamental sciences of the veterinary profession.

Although great has been the achievements of veterinary sanitary control and eradication work during the past quarter of a century, yet it is safe to predict that still greater demands will be made upon the profession in the future. The production and conservation of

[1] Paper read before the Veterinary College Alumni Association of New York University at Carnegie Laboratory, New York, N. Y., March 8, 1920.

beef, mutton, pork, poultry and animal-food products and by-products, as well as hides, leather and wool for clothing, involve for solution many scientific and practical problems that require the expert knowledge of the highly trained veterinarian, who must be nothing less than an animal engineer in a very real and vital sense if an annual loss of $200,000,000 from animal diseases alone is to be saved and a ten-billion-dollar industry conserved, extended and developed to its highest state of efficiency.

The immense value of animal experimentation and investigation is brought to our minds in the exhaustive study of parasitic diseases made by our fellow alumnus, Cooper Curtice. You will be glad to know that to my personal knowledge Curtice is just as close a student today on Uncle Sam's sheep farm in Virginia as he was in New York City back in 1883. The value of his tireless labors to science, to the live-stock industry, to producer and to consumer, is beyond calculation. He has made the world his debtor.

The nation-wide movement recently inaugurated by our Government for the eradication of animal tuberculosis and the establishment of tuberculosis-free herds of cattle progresses satisfactorily under the masterful direction of a veterinarian who is a magnificent example of an animal engineer. I refer to our esteemed fellow alumnus, John A. Kiernan.

I am anxious to see the day come when the best talent of the veterinary profession will be engaged in helping the breeders of this broad land in the production and development of an animal husbandry superior to anything the world has yet seen, instead of its members being compelled to devote their best energies to the control and eradication of diseases most of which would not occur at all under a more intelligent and efficient management of the animal industry.

The replacement of scrub sires among all classes and breeds of domestic animals with purebred or high-grade stock, and also the determination to improve the quality of purebreds themselves, as a nation-wide movement on the part of the United States Department of Agriculture, deserves our highest commendation and the most earnest support of everybody interested in the improvement of live stock.

Do not let us lose sight of the fact that one of our own highly esteemed alumni, G. Howard Davison, of this city, who, by the way, is on the program to speak this afternoon on the sheep industry, is one of a group of a few men who have taken a most conspicuous

part in the development of a better animal husbandry in America. You will recall that Alumnus Davison was one of the founders of the great International Live-Stock Exposition at Chicago and that he has served that organization in the capacity of president. In the publication of *The Field,* beautifully illustrated, he is doing much to promote high ideals in animal husbandry, which is another splendid exemplification of the activities of the veterinarian who is an animal engineer in another field of the profession—*The Field Illustrated.*

I would like to recommend to the University authorities the advisability of bestowing the degree of B.S. or M.S. in animal engineering upon veterinarians who especially distinguish themselves in the study and practical application of scientific principles to the problems of animal husbandry and animal industry.

The veterinarian is a student of life, plant and animal, and in this field his possibilities are simply illimitable. The outlook is most encouraging for those who are fitted and qualified. Let me emphasize that if his investigations and experiments are to be of the greatest value to humanity his work must be constructive in character, and I might mention that the field of his activities are attractive to the true scientist laboring for the solution of fundamental problems.

The development of scientific agriculture and the technical education of agricultural students in animal husbandry at agricultural colleges and experiment stations probably has done more to demonstrate the necessity for men specially fitted and trained in veterinary science than any other one factor. The more agriculture progresses the more its votaries appreciate the importance of a knowledge of comparative medicine in connection with the problems of animal husbandry and the greater is their appreciation of the scientifically trained veterinarian. Animal experimentation and research work has suffered at some of our agricultural colleges and experiment stations because it was impossible to obtain qualified veterinarians fitted by training to take up this specialized line of work of preeminent importance to agriculture. There is also a pressing demand for veterinarians as instructors of agricultural students in veterinary subjects, particularly for students who are specializing in animal husbandry. The mutual reciprocating relations existing between the soil, plants and animals require for the most comprehensive instruction of students that they should be studied from the viewpoint of the veterinarian as well as from that of the agri-

culturist. The various needs of the animal body must be considered, whether for maintenance or for the production of specific commercial products.

The activities of the county agricultural agents if properly exercised tend to extend the practice of the veterinarian. There should be the most cordial coöperation between the county agent and the practicing veterinarian in everything for the benefit of the community.

The artificial conditions under which domestic animals are bred and maintained account for not a few of the diseases that occasion considerable loss to the breeder of purebred stock. Sterility not infrequently will be found to be a condition induced by injudicious breeding and bad management, sometimes resulting in the necessary sacrifice of valuable animals. The veterinarian with a practical knowledge of animal husbandry is sometimes able to overcome this difficulty where others would fail.

The fact that the breeders of dairy cattle in a certain county in Illinois have engaged a qualified veterinarian to have supervision over their stock with the view of preventing disease instead of curing it is a splendid movement and shows the trend of the times. The veterinarian is paid an adequate salary by the breeders, as they realize that prevention is of paramount importance and to the extent that scientists have determined the causes of the various diseases of live stock the war against them can be intelligently conducted. The causes of diseases and the sources of pestering parasites are matters of deep concern to the stockman, and the best methods of warding off diseases and making them innocuous are all-important.

One of the problems that this veterinarian may possibly undertake would be that of improvement in the inherent strength of the constitution and disease-resistant power of the live stock of his community through the mating of more vigorous animals, giving especial attention toward the preventing of infection of the animal at the time of birth. Precaution would also be probably taken against the checking of rapid growth and development while the animal is being maintained in a favorable environment to the exclusion of every detrimental influence.

In every community a large amount of animal waste could be profitably utilized by the establishment of a community conservation plant where carcasses of dead animals would be converted into fertilizer and into commercial products under safe and sanitary

conditions. I mention this in passing as an instance where the veterinarian who is an animal engineer can coöperate with local authorities in an important matter.

A veterinarian who is an animal engineer could readily fill such a position as manager of a stock farm, and there are also opportunities for the right man in every community in sanitary work, meat inspection and dairy inspection.

There is an opportunity for the veterinarian who is an animal engineer to occupy an important place in railroad administration just as soon as he is able to show his worth. He would have charge of handling live-stock transportation problems, sanitary problems, supervision of stockyards, feeding and loading stations, cars, etc. Such a veterinarian would inspect all the territory through which the railroad runs to determine the facilities and conditions for handling live stock and for the purpose of determining the adaptability of the land in various parts of the country for the growing of horses, cattle, sheep and swine. He would also investigate claims made for depreciation of live stock in transit or loss by accident or disease.

A notable falling off in the attendance of the veterinary colleges is reported. There were almost as many students in one of the western schools before the war as there are now in all the veterinary colleges of America. The profession needs more men if progress is to be made in the work and problems that confront it, but they must be men of ability and natural aptitude and possessing a broad education and a high purpose; for, as I have intimated, the day is near at hand when the best talent of the veterinary profession will be more intimately engaged in coöperation with agriculturists in the upbuilding and development of a better and a larger animal husbandry and a greater animal industry. A trained veterinarian who is an expert animal engineer will be in demand for this great constructive enterprise of gigantic proportions involving vast economic and public-health problems. I trust I have at least pointed out the way. Let us prepare.

With the approach of the A. V. M. A. annual meeting at Columbus it seems appropriate to recall the story of the Englishman who appealed to an American to set him right as to the pronunciation of the name of one of the United States. "It is most confusing," he said. "Some of your countrymen call it 'O-hi-o,' while others pronounce it 'I-o-wa.' Now please tell me which is correct."

RABIES AND ITS PREVENTIVE TREATMENT[1]

By JOHN F. MCKENNA, *Fresno, Calif.*

CAUSE OF RABIES

THE cause of rabies is a parasitic protozoan discovered by Negri and generally known as the "Negri body." His work has been corroborated by investigators in all parts of the scientific world.

NATURE OF RABIES

Rabies is transmitted to human beings through bites of rabid animals, most frequently dogs, but also cats, horses, cattle, sheep, goats, hogs, and animals of prey such as wolves, foxes and martens. The saliva of the animal is the medium which carries the virus. The disease may be transmitted by the deposit of saliva, containing the virus, on abraded surfaces, as by licking. In all cases a wound or an abraded surface of the skin is necessary for the absorption of the virus; it can not pass through the sound skin.

PREVALENCE OF RABIES

Rabies occurs in almost every part of the world, Australia being the only country known to be exempt, owing to the rigidly enforced quarantine. In France, Belgium, Hungary and Russia the disease is widespread. England, because of quarantine and periodic muzzling of dogs, was free from the disease for over a decade; but during the World War dogs were brought into the country by airplanes and the disease appeared again.

Rabies occurs in practically every part of the United States. In 1911 Stimson stated that it had been reported in all but six States and that there were 1,381 infected localities. The disease was unusually prevalent in the United States in 1919.

RABIES IN FRESNO COUNTY

During the past several months it has been apparent that rabies is more prevalent in this county than at any time during the past eight years. In two school districts near Sanger it was necessary to establish a quarantine, consisting of the following requirements:

1. All stray or homeless dogs were ordered destroyed.
2. Any dog found on a public highway was destroyed.
3. Owners were required to keep their dogs chained up on their

[1] Presented at a meeting of the Fresno County Medical Association, March 12, 1920.

premises, and were advised to kill any stray dog which came upon their ranches.

With these restrictions we were able in sixty days to eliminate rabies from the above-mentioned districts.

However, during the past ninety days we have found cases of rabies in animals in nearly every other part of the county, and the number of persons which have been bitten by these animals has been particularly noticeable.

The State Board of Health has sent an officer to this section of the State to make a careful study of the condition. He has looked over our records and from this investigation he has placed before the Board of Supervisors certain suggestions for the elimination of this condition and has asked for their adoption.

The writer in his official capacity as county live-stock inspector has on numerous occasions been called on to give advice as to the proper method of handling an animal which has shown signs of this disease, and also by people who have been bitten by animals which had the disease or were suspected of being rapid. On many occasions physicians have asked for advice in reference to whether or not a person bitten by a dog should be subjected to the Pasteur treatment before a positive diagnosis of rabies had been made. This paper has been prepared primarily for the reason that a difference of opinion seems to exist regarding this all-important treatment.

FIRST AID TO PERSONS BITTEN

In case a person is bitten by an animal it is highly advisable that the wound be cauterized at once, preferably by a physician. If it is not possible to have a physician in attendance immediately, the wound can be properly cleansed with warm water and partially cauterized by the patient, to be again cauterized as soon as possible thereafter by the attending physician. Of the cauterizing agents, fuming nitric acid is perhaps the best. Excessive tissue destruction may be diminished by washing afterwards with physiological saline solution. Pure carbolic acid followed by alcohol may be used, although it is not so efficacious as nitric acid. Even better treatment is the application of pure formalin or a 5-per-cent formalin solution applied over a period of 12 hours. In the absence of surgical attendance, cauterization should not be delayed. On the other hand, if, for any reason, it has been delayed even as long as three days, it should not be omitted.

CONTROL OF ANIMALS

Referring now to the animal, it should be placed under the observation of a competent veterinarian, and should not be destroyed immediately unless a positive clinical diagnosis is made that the animal has rabies.

The advantages of holding the animal under observation are, first, in the case of a dog, it may be that the animal was startled and had bitten a person from fright, or it may have been an animal which is mean, or, as it has been our experience, an animal which is ordinarily friendly, at the time of whelping becomes cranky, and will bite at strangers, or at anyone who annoys it. By placing such animals under observation it has many times been the case that they show absolutely no symptoms of rabies, and therefore it was unnecessary for the persons bitten to undergo the Pasteur treatment.

On the other hand, assuming that the history was that the dog was slobbering at the mouth and showing various symptoms before biting, and after having bitten the person it was immediately killed, it is then impossible to arrive at a positive clinical diagnosis, and it is usually useless to send the brain of such an animal to the laboratories for examination, as many times the disease has not developed sufficiently for the laboratories to be able to find the Negri bodies, and, as often is the case where the animal is destroyed by a shotgun, the brain is injured to such an extent that the laboratory examination is useless.

However, by confining the dog and holding it under observation. very often from 12 to 48 hours, it is possible to make a positive clinical diagnosis, and then the head can be properly prepared and sent to the laboratory for a laboratory examination.

INCUBATION

As the average period of incubation is from 30 to 60 days, it is highly advisable in a locality which has a previous record of rabies infection, such as Fresno has, that when a person has been bitten and the clinical symptoms indicate rabies in the inflicting animals, the Pasteur treatment be instituted at once, without waiting for a final diagnosis, which in some cases requires a number of days. This is especially true should the probable infection be on the face, head or hands, as it is a well-known fact that bites in these locations generally have a shorter period of incubation than bites on other parts of the body.

Time is an essential factor in the treatment of patients, and as it requires three weeks to administer the Pasteur treatment and another two weeks before full immunity is established, it can be readily seen why it is advisable to institute treatment as early as possible after the infection.

The shortest authentic record of incubation of which we have any knowledge was 13 days, and that was a child who was bitten on the face. The period of incubation is largely influenced by the following factors:

1. The extent and severity of the wound.
2. The nature of tissue involved. Rabies virus exerts its action upon the central nervous tissue, which it reaches by ascending the peripheral nerves. It is not surprising, therefore, to find that wounds or parts abounding in nerve terminations such as the fingers should be the most dangerous.
3. The distance of the wound from the central nervous system. Wounds about the head on this account are most likely to have a short incubation period, and hence demand immediate treatment.
4. Species of the biting animal. Bites of wolves, coyotes and cats are more dangerous than those of dogs.
5. Promptness and efficiency of cauterization.
6. Promptness with which antirabic treatment has been commenced.
7. It is held by some that wounds caused by teeth which have passed through several layers of clothing are less dangerous than those in which no such means has been afforded for the removal of virus.

PASTEUR TREATMENT

The Pasteur treatment is used as a preventive treatment of rabies during the incubation period. After symptoms of the disease are fully developed the Pasteur treatment is of absolutely no value, for there is no known cure for rabies. In a person who is taking the Pasteur treatment there is a contest of speed between the passage of virus from the wound to the brain by way of the nerves and the development of immunity by the action of the vaccine. It requires two weeks after the completion of the Pasteur treatment for the full development of immunity.

Just how long this immunity can be relied upon to afford protection against possible infection from a subsequent bite is not definitely known. Probably after the first month the degree of protection gradually diminishes. Therefore, after a few months have

elapsed, it is not safe to consider that sufficient protective substances remain in the tissues to combat possible infection from a second bite.

Microscopic examination of the animal's brain fails in about 3 per cent of cases to show lesions of rabies, and a considerable period of time may be required for a positive diagnosis to be made from the animal by the inoculation test. Hence, if Pasteur treatment for the bitten individual be delayed for a positive diagnosis, the disease may gain such headway that there will not be sufficient time to establish immunity. Therefore the safest procedure is to start the Pasteur treatment early (within a week after the biting if possible) without waiting for diagnosis to be made from the animal.

The Pasteur treatment covers a period of 21 days. The injections are given subcutaneously with an ordinary hypodermic syringe. It is advisable to alternate successive injections, using the subcutaneous tissues of the anterior abdominal wall and of the interscapular region, so that the vaccine will be well distributed and local reactions minimized. There need be no interruption of the patient's daily work, for the treatment can be administered in the patient's home or in the physician's office.

CARE OF PATIENT

The bowels should be kept freely open during the course of the Pasteur treatment, and the drinking of tea, coffee and alcoholic beverages allowed but sparingly. Exposure to cold, as well as excessive fatigue, should be avoided. Some local soreness, together with urticaria and erythema, may occur about the site of the injections. If this local reaction is marked, the application of a wet dressing of aluminum acetate solution will be found useful; or alcoholic solution of menthol or the classical calamine lotion may be used to good advantage.

RESULTS OF PASTEUR TREATMENT

The mortality among bitten individuals who do not take treatment is reported by various authorities as about 15 per cent. According to Stimson,[1] "in general it may be stated that the total mortality of bitten persons having received the antirabic inoculations is pretty constantly about 1 per cent, of which one-half could not, from the nature of the treatment, have been expected to live on account of the short time permitted for the establishment of immu-

[1] Bulletin 65, U. S. Hygienic Laboratory, Public Health Service, 1910.

nity. In other words, 0.5 per cent die of rabies within 15 days after the completion of the treatment that can not be charged to its failure but to a want of time to establish immunity."

The report of Viala[2] states that during the year 1918 there were 1,803 persons who took the Pasteur treatment at the Pasteur Institute in Paris, and of this number 3 died with rabies, making a mortality of 0.16 per cent. He also gives a table summarizing the results of the Pasteur treatment since its origin in 1886 up to 1918, inclusive. The table shows that during this period of 33 years 39,880 persons were treated, with a total of 140 deaths, or a mortality of 0.35 per cent.

PRINCIPLE OF PASTEUR TREATMENT

The principle upon which the Pasteur treatment is based is the production of immunity by the inoculation of rabies virus so modified as to render it innocuous. Pasteur first accomplished this by serial inoculation of monkeys, in which animal the virus loses its potency. Test animals inoculated with the spinal cord of these monkeys become immune to subsequent infection with virulent rabies virus. This method was, however, obviously inapplicable to man on a large scale. He finally devised the method at present in use, which involves the treatment of the virus in two steps; first, the serial passage of the virus in rabbits until a fixed degree of virulence is reached; second, the attenuation of this rabbit virus by desiccation.

WHO SHALL RECEIVE THE PASTEUR TREATMENT

Persons who have been bitten by rabid animals or who have had open wounds or scratches contaminated with the saliva of such animals should receive the treatment. At times the question has been raised whether persons who have drunk of the milk of rabid cows should be subjected to the preventive inoculations. While the possibility of infection by this means is extremely remote, there is some evidence that the virus can sometimes be present in the milk. On the other hand, infection through the intact mucosa of the alimentary tract is highly improbable, since the action of the gastric juice is destructive to the virus.

Persons bitten by animals presenting symptoms strongly suggestive of rabies should receive the antirabic treatment whether or not the suspicion is confirmed by histological examination and

[2] Annales de l'Institut Pasteur, July, 1919, p. 484.

pending the result of the inoculation test, if such is made. The necessity for treatment arises from the fact that rabies is really much more prevalent among animals than is generally suspected, and too much valuable time will be lost by delaying treatment for the result of animal inoculation.

Persons bitten by animals not showing any of the symptoms of rabies are not exempt from the necessity for treatment until the biting animal, which should be closely confined and carefully observed for certainly not less than two weeks, shall be shown to be free from the disease, since the saliva is known to be virulent sometimes several days before the onset of the symptoms, 4 to 5 days according to Roux and Nocard, 12 days according to Zagarro.

In this connection it is deemed pertinent to repeat that the histological examination is conclusive only when positive; that Negri bodies when demonstrable in the central nervous system are positive indication, according to present knowledge, that the animal was rabid; but the failure to find them does not exclude rabies, since they may not have developed to a demonstrable condition at the time the animal was killed, or they may have escaped detection through technical imperfections, or, finally, they may not be present in the portions examined even in well-developed rabies.

DILUTION METHOD

The dilution method, consisting of a suspension of the emulsified brain from rabbits injected with the fixed virus, is now being used extensively in the treatment of rabies in animals, and this treatment requires but 6 injections.

In the past year one laboratory alone supplied 1,200 such treatments, and only 7 cases of rabies developed among the treated animals. This must be considered a remarkable record in view of the fact that in practically all cases the treated animals were bitten by mad dogs.

Drs. W. M. Lynn, M. J. Kemen and B. N. Lauderdale were transferred from hog-cholera control work to tick eradication May 16, 1920. Since then Drs. A. A. Husman, J. W. Venable, B. F. Rostetter, W. G. Ross and H. H. Kettler have been transferred to the same line of work.

Dr. A. L. Bevan, on hog-cholera work in Mississippi, resigned from Bureau service, effective July 1, 1920.

CLINICAL AND CASE REPORTS

QUITTOR TREATMENT AS CARRIED OUT IN A FRENCH MILITARY HOSPITAL

By EDW. K. SALES, *East Lansing, Mich.*

WHILE on duty at the French Veterinary Hospital of Surgery located in the town of Rambervillers, France, during the fall and winter of 1917-18, I had an opportunity to see several radical quittor operations performed and to perform one or two myself. The results obtained from this operation by the French and the results obtained myself after leaving the French are the reasons why I make this attempt to explain this operation so that it will be available to those who might wish to attempt it.

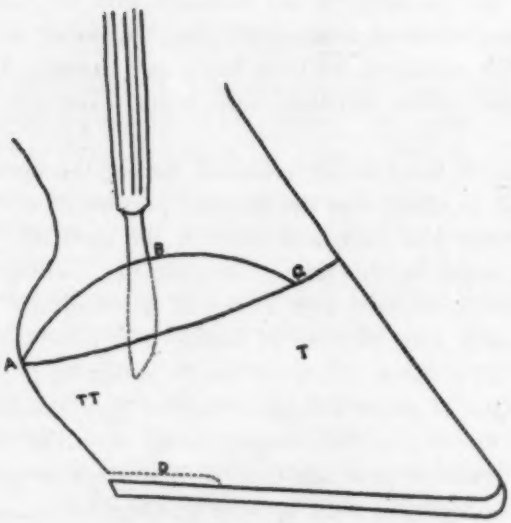
The object of the operation is to bring about a cure of quittor by completely removing the affected lateral cartilage. Recent cases are the most desirable ones to operate on, though the operation is very successful on chronic ones, providing attempts to cure with caustics have not been made. Where caustic treatment has been practiced without obtaining results there is usually so much fibrosis present that it is impossible to remove all the affected tissue, which is very necessary in order to obtain good results.

The instruments used are an elastic ligature to be used as a tourniquet, a razor, a sage knife with slight curve to blade (an ordinary straight scalpel may be used), a scalpel, a pair of tissue forceps, a medium-sized curette, an all-metal hoof knife and a pair of curved scissors.

The patient is placed in the recumbent position on a mat or pile of straw by means of a set of English hobbles, so that the affected cartilage is uppermost. The diseased limb is then freed, and if it is a hind limb it is drawn forward and made fast to the forearm of the upper fore limb, and if it is a fore limb it is drawn backward and made fast in a similar manner just above the hock of the upper hind limb.

The French used no anesthetic for this operation. Chloroform is to be recommended, though local anesthetics are successfully employed.

As soon as the patient is securely restrained, the area over and about the region of the lateral cartilage is clipped, washed with soap and warm water, and then shaved. When dry the immediate



French Operation for Quittor.

T, area where thumb is placed.
TT, area where thumb is placed were it necessary to make the incision from C to A instead of from A to C as described.
A-B-C indicates upper border of first incision.
A-C indicates dorsal border of coronary band where second incision is made.
D indicates portion of hoof removed to relieve pressure on affected quarter. (Not absolutely necessary.)

operative area is painted with tincture of iodine. The elastic ligature (a piece of small rubber tubing makes a very good one) is then applied very tightly around the middle region of the pastern. This controls the hemorrhage to such an extent that the operation is practically bloodless.

The operator, kneeling at the extremity of the affected limb, takes the sage knife or large straight scalpel with the right hand, the thumb of which is placed firmly on the hoof at the area marked T on the illustration. The point of the knife is then forced through the skin and tissues at point A just above the coronary band. Keeping the blade parallel with the inner surface of the lateral cartilage, and with the point inserted deep enough so that it is at or near the inner ventral border of the cartilage, a circular incision is made as indicated by line A-B-C. The knife is now removed from this first incision, and a second incision through the skin and tissues to the cartilage is made along the dorsal border of the coronary band as indicated by line A-C. The knife is now replaced in the first incision with the handle held horizontal with the coro-

nary band, and as much of the cartilage with the skin and tissue over it is scooped out as is possible. The remainder of the cartilage is removed by means of the hoof knife and curette. It is essential to remove the entire cartilage, care being taken not to open the coffin joint.

The coronary band is not molested during the operation unless it is diseased, in which case the diseased portion should be removed.

If the quittor has burrowed through the cartilage, leaving foci of infected areas in the tissues beneath the cartilage, these foci should be well cauterized with a stick of silver nitrate. The wound is then painted with tincture of iodine and filled with powdered boric acid, over which plenty of sterile cotton is placed and held there by means of gauze bandages applied very snugly.

The first dressing is left without being disturbed for 48 hours, when it is removed and replaced with a fresh one. During the first few dressings one must be sure that the bottom of the wound is well swabbed out with dry sterile cotton.

If there is a tendency for granulations to form, this may be overcome by applying the bandages more tightly and adding a little iodoform to the boric acid, which tends to keep the wound less moist.

Very few bad after-effects follow this operation. Infection seems to play a very important part, as there is almost perfect drainage and the wound heals rapidly. At the end of three weeks following the operation there is little more than a simple skin wound left, and the patient can be returned to work completely cured at the end of the fifth to sixth week.

I believe this operation is more practicable than any other radical operation for quittor, as it only takes from 10 to 15 minutes to perform it; the hoof is not mutilated in any manner, making it a very easy and simple operation to perform; and lastly, as good results have been obtained by this method as by any other radical method.

In honor of the late Prof. A. Liautard, his daughter, Madame Boyer, has given to the Alfort Veterinary School of France a fund of 5,000 francs, from the proceeds of which an annual prize of 250 francs, to be known as the Liautard prize, is to be awarded to the fourth-year student submitting the best paper based on his clinical work.

ABSTRACTS

How a Dog of Healthy Appearance Can Transmit Rabies. P. Remlinger. Bul. Soc. Cent. Méd. Vét., June, 1919, p. 175. Abstract in Rev. Gén. Méd. Vét., Aug., 1919, p. 440.

In a communication on the treatment of rabies in 1907, Remlinger drew attention to the possibility of the transmission of rabies by healthy dogs.

Several observations of this sort have been published, but all of these cases can be criticised for many reasons: The diagnosis of rabies has been incorrect; the person bitten could have been infected by some other dog than the one incriminated; the biting dog, pronounced healthy, could have been a carrier of virulent saliva from a rabid dog (lips, tongue, teeth contaminated by droolings from another dog); finally, according to Babes, the biting dog could be cured of the abortive manifestations of rabies.

The experimental studies of Konradi and Remlinger on the passage of rabies from mother to fetus permits viewing the question in a different light.

Konradi inoculated rabies virus into guinea pigs and rabbits; after a varying number of days (18 to 88), these animals gave birth to absolutely normal young. At the end of from 80 to 90 days the young succumbed to rabies. At this time the mothers were in perfect health and it was only much later, 164 to 487 days afterwards, that they showed symptoms of rabies.

The author being a little skeptical about these facts, verified them experimentally.

Two guinea pigs, a male and a female, were inoculated with street virus and placed in the same cage; on the 13th day the male showed the first symptoms of paralytic rabies; it died on the 16th day. The female remained well, giving birth to three young 50 days after the inoculation. One of these died after 13 days without the cause of its death being determined. The other two remained well up to the 32nd day. On this date they showed symptoms of generalized paralysis and died on the 34th day. The autopsy was negative; their brains and bulbs were inoculated into two guinea pigs which died of rabies. The mother, which had remained well, died of rabies on the 39th day after the death of the young, or 123 days after its inoculation and 69 days after parturition.

The rabbit and guinea pigs are able to transmit rabies to their

young in utero, although they themselves are healthy. Konradi observed experimentally an analogous phenomenon in the dog and concluded that in so far as the transmission of rabies from the mother to the fetus is concerned, this is to say, the presence of the rabies virus in the blood, difference of species does not seem to be a factor.

From experiments made with street virus, one can infer that the phenomena observed in the laboratory may be duplicated in nature. It seems possible that the saliva, which really should receive its virulence from the blood, is virulent at an undetermined period before the appearance of the first symptoms of rabies.

Remlinger draws the following conclusions:

1. There exists in rabies well before the appearance of symptoms a latest blood phase which does not manifest itself by any symptoms other than perhaps some slight fever.

2. At this stage the female can transmit the disease to its young through the placenta (undeniable proof of her being infected). It seems proper to infer that she is equally able to infect man or animals by means of the saliva.

This last point should be demonstrated experimentally, but this presents considerable difficulties, although not insurmountable.

L. T. GILTNER.

THE WHORLED MILKWEED (ASCLEPIAS GALIOIDES) AS A POISONOUS PLANT. C. Dwight Marsh, A. B. Clawson, J. F. Couch and W. W. Eggleston. Bul. 800, U. S. Dept. Agr., 1920.

The whorled milkweed (identified botanically as *Asclepias galioides*, cited in previous publications as *A. verticillata*) ranges northward from Central America through Arizona and New Mexico to central Utah and central Colorado. Its natural habitat is the dry plains and foothills. Its downy seeds are adapted to wind dispersal, but in the irrigated orchards and fields, where it is becoming abundant, the rapid increase has been due largely to water transportation of the seeds along the irrigating ditches.

Feeding experiments demonstrated that the plant is exceedingly poisonous to horses, cattle and sheep, but most of the reported losses have been of sheep. Generally the first evidence of intoxication is the loss of control of the muscles. The animal staggers when walking and eventually falls and is unable to rise. Sometimes it is found down before any other symptoms appear. At this time in most cases there is salivation and there may be marked trembling.

Usually there is a pronounced elevation in temperature soon after the first symptoms appear. The most marked symptoms are violent spasms at short intervals. As the illness proceeds, in the intervals between the spasms, while lying upon its side, the animal moves its legs as though walking or running. The spasms become less intense and death comes from respiratory paralysis. Bloating caused by gas is one of the most noticeable features of poisoned sheep. Autopsy and microscopical examination show congestion of the peripheral blood vessels, the congestion being especially marked in some glands, the lungs and the central nervous system.

The chemical examination of the plant, while incomplete, has demonstrated the existence of definite toxic compounds, part of which are glucosidal in nature. The plant contains also a minute quantity of nontoxic alkaloid.

There is no medicinal remedy which gives satisfactory results. Reliance must be placed on the destruction of the plant and such care of stock as will prevent hungry animals from coming into contact with masses of the weed.

CHRONIC EMPHYSEMA OF THE LUNGS FOLLOWING FOOT-AND-MOUTH DISEASE. Tijdschrift Voor Diergeneeskunde, vol. 46, part 21.

Permanent affections of the udder and deformities of the feet frequently follow outbreaks of foot-and-mouth disease. In addition to these, chronic emphysema of the lungs is a serious and frequent sequel. After an outbreak of foot-and-mouth disease the number of cattle with affected breathing is enormous, even among herds that have passed through the epizootic in the open pasture.

If the cattle are in the stable while sick, the vesicles in the mouth may prove benign. Very different terminations may be expected during the dry weeks of May and June. Some outbreaks leave more permanently affected cattle behind them than others. Thus the epizootic of 1911 was remarkably malignant, and a large number of animals suffering from resultant diseases was left behind after the acute stage of the outbreak had been overcome.

The number of emphysematous cattle is small among those that have been treated with serum immediately on the first appearance of the disease. This apparently indicates that there is a relationship between the affection of the lungs and the virus of foot-and-mouth disease.

It is well known that during May and June the temperature

variations between day and night are very great and that cattle affected with aphthous fever during these months suffer greatly from bronchial catarrh.

The writer had opportunty to study a typical case occurring in a registered cow that had been treated with serum, yet had developed pleuritis. She was placed in the stable before any of her vesicles had ruptured. Her temperature rose to 40.8° C. Appetite was diminished. After 14 days the animal had recovered from the visible indications of foot-and-mouth disease, but was only giving about one-third of her usual flow of milk. Auscultation showed nothing abnormal, but on percussion a more or less tympanitic tone was evident.

A few weeks later it was noticed that the animal, although presenting a very good outward appearance, was breathing rapidly. She appeared to be asthmatic and showed the symptoms usually shown by asthmatic cattle after foot-and-mouth disease.

A large number of cattle at this time were affected with myocarditis, and it is possible that foot-and-mouth virus can affect the various organs of the thoracic cavity. This is the case with other infectious diseases.

Emphysema is not rare among cattle. But the cases commonly occurring present very mild symptoms. Sufferers from the disease as a sequel to foot-and-mouth disease, however, show an abnormally heavy growth of hair over the entire body. This hair is rough and dull and never smooth and attractive. The writer has seen some hides that reminded him of the skin from a bear.

In the writer's practice there are herds of cattle in which more than half of the animals are affected with emphysema of the lungs. These animals are of little value to their owners, because they are affected with an incurable disease and their flow of milk remains perceptibly at less than half of their normal production.

Every method of treatment stands powerless before this disease. The affected cattle do not cough. They have accelerated breathing. In warm weather they stand with nostrils dilated, foam dropping from the nasal cavities, and sometimes with the mouth opened. On auscultation, superficial respirations are noted. Tympanitic sounds are detected on percussion.

In the 1911 epizootic it was observed by the writer that those cattle suffering from emphysema following foot-and-mouth disease were able to transmit the latter disease for months. They are therefore infection carriers. This fact is of great importance and

proves that emphysema is one of the sequels of an outbreak of foot-and-mouth disease. H. J. WASHBURN.

OBSERVATIONS ON THE LIFE HISTORY OF ASCARIS LUMBRICOIDES. B. H. Ransom and W. D. Foster. U. S. Dept. Agr. Bul. 817 (1920), 47 pp., 6 figs.

Recent investigations by Stewart, Yoshida, and the writers of the present paper have resulted in a revision of former ideas as to the life history of the common intestinal roundworm *(Ascaris lumbricoides)* of man and the related and probably identical form *(Ascaris suum)* parasitic in the pig. It was formerly assumed that after the young worms had hatched in the intestine from the eggs swallowed with food or water by a human being or pig they settled down and developed to maturity. Stewart found that if the eggs after proper incubation are fed to rats or mice they hatch in the intestine, but that the larvæ instead of settling down at once migrate out of the intestine and pass to the liver, lungs, and occasionally the spleen, meanwhile undergoing growth and development. Those that reach the lungs pass up the trachea, down the esophagus, through the stomach, into the intestine, linger in the large intestine and cecum for a few days, and finally pass out of the body in the feces. Migration up the trachea is well established in 7 to 10 days after the eggs are ingested, and the total period of migration extends over about 2 weeks.

Stewart assumed that the behavior of the parasite in rats and mice indicated that these animals play the part of necessary intermediate hosts, and that human beings and pigs become infected as a result of swallowing food or water that has been contaminated by the feces or saliva of infested rats or mice. Ransom and Foster, however, have demonstrated that infection of the usual hosts (man, pig) results from ingestion of the eggs, that the larvæ undergo the same sort of migration that they do in rats and mice, and that instead of finally leaving the body in the feces the larvæ after migrating through the lungs establish themselves in the small intestine and develop to maturity. About 2½ months is required for the worms to become mature after the eggs are swallowed. The failure of the parasites to establish themselves in the intestine after their migration through the lungs in rats, mice, guinea pigs, rabbits, etc., is simply an expression of an imperfect adaption of the parasites to these hosts. In sheep and goats, which are better adapted as hosts than smaller animals (rats, guinea pigs, etc.), the parasite may estab-

lish itself in the intestine and survive for considerable periods (over 3 months at least), and approach, though apparently it never reaches, fertile maturity. As first observed by Stewart the migrating larvæ in passing through the lungs cause considerable damage, and heavily infested animals, including young pigs as well as smaller laboratory animals, commonly die as a result of the lung invasion in a week or ten days after ingesting the eggs. Undoubtedly many of the cases of so-called "thumps" in young pigs are caused by *Ascaris* larvæ, and it is also not unlikely that in some of the lung troubles of obscure etiology among children *Ascaris* larvæ will be found to be involved.

In view of the great prevalence of *Ascaris* infestation among swine it is evident that the new knowledge that has been gained concerning the life history of this parasite has a highly important bearing upon the problem of reducing losses from swine diseases. It is to be hoped that in the future more attention will be paid to the matter of eradicating and controlling *Ascaris* than has commonly been done in the past. There can be no question that a little care in this respect on the part of swine breeders generally will result in a very great reduction in the huge losses that are now caused every year by *Ascaris* infestation.

B. H. RANSOM.

REVIEW

PARASITES AND PARASITOSIS OF THE DOMESTIC ANIMALS. THE ZOÖLOGY AND CONTROL OF THE ANIMAL PARASITES AND THE PATHOGENESIS AND TREATMENT OF PARASITIC DISEASES. By B. M. Underhill, Professor of Parasitology and Instructor in Zoölogy and Histology, School of Veterinary Medicine, University of Pennsylvania. One volume of 379 pages, 172 text figures, and 8 plates. The Macmillan Company, publishers, New York.

In this work, as intimated in the preface, the author has endeavored to present the subject systematically, concisely, and simply, and in a manner that he considers will best meet the needs of the student and practitioner. The book is a great improvement over works heretofore published in the United States and designed for use as text-books in teaching the subject of veterinary parasitology. Some important and well-established facts have been omitted that might have been included, and some minor errors have been made, but these defects will undoubtedly be remedied in future editions.

For example, no reference is made to the work of Van Saceghem, Bull, Hill or Ransom on the life history of *Habronema*, the oil of chenopodium treatment for ascariasis is not mentioned, the hookworms of cattle and sheep are listed as only occasional parasites, it is stated that the eggs of *Syngamus trachealis* "can not be extruded and are only liberated by the rupture or disintegration of the mother worm" (notwithstanding another statement on the same page relating to Railliet's observations that the eggs are deposited through the vulva and escsape from beneath the bursa of the male), the only cylicostome of the horse that is mentioned is *Cylicostomum tetracanthum*, no mention is made of *Triodontophorus tenuicollis* which causes conspicuous ulcers in the colon of the horse, and Kilborne alone is credited with the discovery of the transmission of Texas fever by the tick.

The book is very well printed and bound considering the present-day difficulties with which book publishers have to contend. Supplementing the illustrations that have been gathered from the works of other authors are a few original illustrations; some of these, especially the photomicrographs, could be greatly improved.

B. H. R.

Dr. O. B. Hess, formerly in charge of the Division of Hog Cholera Control and now with the Fort Dodge Serum Company, was a visitor at the Washington offices late in May.

Dr. C. T. Tawney has been transferred from hog-cholera control work in Michigan to quarantine inspection with official headquarters at Bismarck, N. D.

Dr. W. N. Cochran has resigned his position with the Swan-Myers Company of Indianapolis, Ind., and has engaged in practice at Belzoni, Miss.

Dr. A. H. Logan is being transferred from educational hog-cholera work in Florida to hog-cholera control work in South Carolina.

Dr. Frank B. Jones is transferred from hog-cholera control work in Missouri to virus-serum inspection at Kansas City, Mo.

Dr. F. P. Miller is transferred from hog-cholera work in North Carolina to virus-serum inspection at East St. Louis, Ill.

ASSOCIATION NEWS

AMERICAN VETERINARY MEDICAL ASSOCIATION

Program of the Fifty-Seventh Annual Meeting

The following is a tentative program as arranged for the Fifty-seventh Annual Meeting of the American Veterinary Medical Association to be held in Columbus, Ohio, August 23 to 27, inclusive. The final arrangement of time for the sessional and general programs will be made in the official program that will be sent out to all members about the first of August.

The program will open August 23 at 10 a. m. at Memorial Hall with an address of welcome and response, followed by the President's address, reports of Executive Board, Secretary, Treasurer and committees. For the general program, the following subjects will be presented:

PROGRAM FOR THE GENERAL SESSIONS

Veterinary Education and Its Readjustment.
Dr. C. D. McGilvray Toronto, Canada.

The Relation of the Agricultural Press to the Veterinarian.
Mr. E. S. Bayard, Editor of the *National Stockman and Farmer*, Pittsburgh, Pa.

Sound Live-Stock Sanitary Laws; Their Value to the Farmer and Breeder.
Hon. H. H. Halladay, Commissioner of Animal Industry, Lansing, Mich.

The International Exchange of Live Stock.
Mr. G. F. Finlay, Walter-and-Eliza-Hall Veterinary Research Fellow of Sydney University, Australia.

The Responsibility Confronting the Veterinary Profession.
Dr. William Herbert Lowe, Paterson, N. J.

Dollars versus Health.
Dr. William Thomson, Quarantine Inspector, Keremeos, British Columbia.

The Horse and Mule; Their Indispensability to Mankind.
Wayne Dinsmore, Secretary, Horse Association of America, Chicago, Ill.

Municipal Milk Supply.
Lieut. Col. D. S. Tamblyn, Regina, Saskatchewan, Canada.

Injustice Done Bureau Veterinarians by Congressional Reclassification Commission.
Dr. J. A. Kiernan, Washington, D. C.

Administration of the Meat Inspection Law by the Bureau of Animal Industry During the War.
Dr. W. N. Neil, Chicago, Ill.
The Micro-Particles of the Blood and Other Body Fluids.
Profs. S. H. Gage and P. A. Fish, Ithaca, N. Y.
The Production and Inspection of Veterinary Biologics.
Dr. D. I. Skidmore, Washington, D. C.

PROGRAM FOR SECTION ON GENERAL PRACTICE AND SURGERY

First Session

Chairman's Address.
Dr. H. E. Bemis, Ames, Iowa.
French and American Practice Compared.
Dr. L. A. Merillat, Orrville, Ohio.
Anesthesia in Veterinary Operations.
Dr. R. R. Dykstra, Manhattan, Kans.
The Therapy of the Endocrine Glands.
Dr. E. L. Quitman, Chicago, Ill.
Some Practical Points on the Anatomy of the Ox and Pig.
Dr. H. S. Murphey, Ames, Iowa.
Traumatic Indigestion in Cattle.
Dr. D. H. Udall, Ithaca, N. Y.
Discussion led by Dr. T. H. Ferguson, Lake Geneva, Wis.
Swine Diseases.
Drs. C. H. Stange and Charles Murray, Ames, Iowa.
Cæsarean Section on Swine.
Dr. W. E. Macklin, Coon Rapids, Iowa.

Second Session

Prolapse of the Vagina and Uterus in Brood Bitches and of the Rectum in Puppies; Their Causes and Treatment.
Dr. J. C. Flynn, Kansas City, Mo.
Diagnosis and Treatment of Certain Skin Diseases of Dogs.
Dr. H. J. Milks, Ithaca, N. Y.
Verminous Colitis of Dogs and Its Medical and Surgical Treatment.
Dr. Frank H. Miller, New York, N. Y.
Kennel Hygiene and Breeding.
Dr. E. D. King, Mobile, Ala.
Sclerostomiasis in Horses.
Dr. C. E. Covault, Ames, Iowa.
Amputation of the Penis; Report on 100 Cases.
Major W. J. Ratigan, Camp Funston, Kans.
Treatment of Cryptorchidism.
Dr. E. E. Wegner, Pullman, Wash.

PROGRAM FOR SECTION ON SANITARY SCIENCE AND POLICE

First Session

Chairman's Address.
Dr. L. Enos Day, Chicago, Ill.

Secretary's Report.
Dr. H. Preston Hoskins, Detroit, Mich.
Eradicating Tuberculosis in Pennsylvania.
Dr. Samuel E. Bruner, Harrisburg, Pa.
Combination Tuberculin Tests.
Dr. Henry W. Turner, New Hope, Pa.
The Preparation of Tuberculins.
Drs. Fred Boerner, Jr., and Miller F. Barnes, Philadelphia. Pa.
The Superiority of Combination Tuberculin Tests over any Other Method.
Dr. L. B. Ernest, Washington, D. C.
Discussion of Papers on Tuberculosis, opened by
Dr. Veranus A. Moore, Ithaca, N. Y.
Activities of the Bureau Laboratories in Washington.
Dr. J. S. Buckley, Washington, D. C.
The Bacterial Content of the Genital Tract of Cows and Its Relation to Calf Infections.
Dr. C. M. Carpenter, Ithaca, N. Y.
Some Studies in Infectious Abortion.
Dr. I. F. Huddleson, East Lansing, Mich.
Infectious Abortion Studies.
Drs. B. T. Simms and F. W. Miller, Corvallis, Oreg.
The Restraint of Abortion Disease in Cattle.
Dr. J. P. Turner, Washington, D. C.
Equine Infectious Abortion.
Dr. R. A. Kelser, Washington, D. C.
Abortion and Sterility in Swine.
Dr. J. W. Connoway, Columbia, Mo.

Second Session

Susceptibility to Cholera of Young Pigs from Immune Mothers.
Dr. E. M. Pickens, College Park, Md.
Field Observations in the Control of Infectious Swine Diseases.
Dr. M. Jacob, State Veterinarian, Nashville, Tenn.
Protozoan Forms and Their Relation to Diarrhea and Colitis in Shoats.
Dr. W. W. Dimock, Lexington, Ky.
Discussion of Papers on Swine Diseases, opened by
Dr. R. R. Birch, Ithaca, N. Y.
The Control of Anthrax in the Canal Zone.
Dr. W. J. Taylor, Cristobal, Canal Zone.
The Dissemination of Anthrax Infection through Industrial Sources.
Drs. A. Eichhorn, Pearl River, N. Y., and A. L. Edmunds, Franklin Falls, N. H.
The Therapeutics and Prophylaxis, of Contagious Epithelioma of Fowls.
Dr. J. R. Beach, University Farm, Davis, Calif.

Bovine Coccidiosis in British Columbia.
Dr. E. A. Bruce, Agassiz, British Columbia.
Botulism in Cattle.
Drs. Robert Graham and H. R. Schwarze, Champaign, Ill.
Rhabdomyoma in Sheep.
Dr. L. E. Day, Chicago, Ill.
Election of Officers.

PROGRAM FOR THE SECTION OF FACULTIES AND EXAMINING BOARDS

Remarks by Chairman.
Dr. Reuben Hilty, Toledo, Ohio.
Report of Secretary.
Dr. H. S. Murphey.
1. College Training for B. A. I. Veterinarians.
Dr. John R. Mohler, Chief, Bureau of Animal Industry, Washington, D. C.
a. Meat Inspection.
b. Quarantine.
c. Investigation.
d. Educational Field Work.
2. Training of Veterinarians for City Food Inspection.
Dr. R. J. Carver, Columbus, Ohio.
3. Veterinary Training from the State Board Standpoint.
Dr. C. W. Fogle, Leipsic, Ohio.
4. Training of Veterinarians for General Practice.
Dr. J. F. Planz, Akron, Ohio.
4a. Training of Veterinarians for General Practice.
Dr. C. E. Cotton, St. Paul, Minn.
5. The Future Training of Veterinarians Particularly for Teaching Work.
Dr. D. S. White, O.S.U., Columbus, Ohio.
6. Ideal Laboratory and Clinical Training at the Present Time.
Dean C. H. Stange, Ames, Iowa.
7. The Training of Veterinarians for Research.
Dr. Theobald Smith, Rockefeller Institute, Princeton, N. J.
8. Animal Husbandry in the Veterinary Curriculum.
Dr. George A. Dick, West Philadelphia, Pa.
9. To Choose Title.
Dr. Otto Faust, Poughkeepsie, N. Y.
10. Entrance Requirements.
Dr. Charles D. McGilvray, Toronto, Canada.

ENTERTAINMENT

The local committee and veterinarians of Ohio have arranged an unusually fine program for the entertainment of the ladies. The following is an outline:

Monday, August 23, at 8 o'clock p. m., the President's Reception in Ball Room of Deshler Hotel, followed by dancing. Fruit punch will be served.

Tuesday afternoon, August 24, at 2 p. m., Ohio Clover Leaf Party for ladies. Committee in charge: Mrs. Brumly, Mrs. Lambert and Mrs. Hyde. An entertainment will be furnished, including readings, singing and dancing, and a lunch will be served.

Wednesday, August 25, movie party at Southern Theatre, in charge of Mrs. Brown. Full orchestra will be in attendance, with soloists.

Wednesday evening, August 25, at 7:45 p. m., at Coliseum Fairgrounds, for men and women. A dancing pageant with 600 performers, accompanied by large military band.

Thursday, August 26, for ladies only, picnic, with refreshments, at the Spring in University grounds.

Thursday evening, August 26, banquet and cabaret at Deshler Hotel, for men and women. The Hon. Rowland C. Baggett, of Dayton, to deliver the principal address at banquet. Cabaret will be put on during banquet, consisting of singing and other amusements.

Two large busses that will carry fifty people will be in attendance in front of the Deshler Hotel at all times during the meeting, for sight-seeing trips around Columbus.

LADIES' AUXILIARY OF THE A. V. M. A.

Meeting, Monday Afternoon, at 2:30 p. m.

Opening Prayer, Mrs. F. H. Schneider, Philadelphia.
Address of Welcome, Mrs. T. A. Burnett, Columbus.
President's Address, Mrs. W. H. Hoskins, New York.
Reports of other Officers:
Recording Secretary, Mrs. C. E. Cotton, Minneapolis.
Treasurer, Mrs. T. E. Smith, Jersey City.
Corresponding Secretary, Mrs. A. Lockhart, Kansas City.
Papers by:
Mrs. C. A. Cary, Auburn, Ala.
Mrs. W. H. Lowe, Paterson, N. J.
Election of Officers.

FROM THE SECRETARY'S OFFICE

LETTERS have been sent to all Resident Secretaries of the A. V. M. A. for the various States and Provinces urging them to get all eligible veterinarians to send in their applications for membership as soon as possible. All applications should be in by August 1.

The progress and welfare of the A. V. M. A. depend largely upon the efforts of each individual member. You should try to secure at least one new member—more if you can.

The program is being arranged, and it is an unusually fine one that will appeal to every practitioner. A copy of the printed program will be sent to every member by August 1 with a statement for dues for the coming year. The program will also appear in the August number of the JOURNAL.

There are also a number of important questions dealing with the future policy of the A. V. M. A. that will be presented to the members at the Columbus meeting.

Every member of the A. V. M. A. should make a special effort to attend the Columbus meeting, August 23-27, as it promises to be the largest veterinary association meeting ever held and we believe it will be the best. N. S. MAYO, *Secretary.*

THE SHRINE CLUB OF THE A. V. M. A.

List Ye Shereefs to the Muezzin's Call:

A great caravan is forming to cross the desert to the Oasis of Columbus, on the Olentangy River, where the nobility of Aladdin Temple have their being. Inshallah, we shall hold forth there on August 23-27, 1920. Learned hakins and pundits, scholars all, will discourse on the make-up and habits of the camel, that noble ship of the arid desert.

So gird up your loins—slip into your sandals—cover your body with a clean yekel—rewind your tarboosh about your brow—bring the queen of your harem—let your oldest mother-in-law take care of the house—mount your best camel and come to Columbus, O-H & a IO, an oasis where the date plam flourishes and where mayhap or perhap—at so much a hap—sparkling waters from the fountain that is at Zem-Zem can be had.

And may Allah permit all Shereefs to gather on these dates that justice may be meted out.

It is written. C. J. BECKER, *Secretary.*

Dr. Robert D. Wall on July 1 resigned his position as State Veterinarian of Iowa to engage in private practice at Des Moines. His place will be taken by Dr. Peter Malcolm of New Hampton.

Dr. E. M. Wiggs resigned as State Veterinarian of Texas on July 1 and will engage in the dairy cattle business at Mineral Wells, Texas. He has been succeeded by Dr. L. G. Cloud of Fort Worth, Texas.

OTHER ASSOCIATIONS

WORLD WAR VETERINARIANS OF AMERICA

Attention is called to the annual meeting of the World War Veterinarians of America, which is to be held in connection with the annual convention of the American Veterinary Medical Association at Columbus, Ohio, August 23 to 27 inclusive, the exact meeting date to be announced at Columbus.

The prospects of this meeting are causing much enthusiasm, and it is necessary that those who have not shown a great interest up to the present time execute a right-about-face! Come to the meeting and help in the constructive work that will take place in August at Columbus. A constitution is to be adopted, officers elected for the ensuing year, and definite plans formulated for the year 1921. Features of interest to veterans of the war are being arranged, such as moving pictures of veterinary affairs at home and in France, obtained from the War Department, beside sociable get-together meetings, etc.

The present officers of the W. W. V. A. will all be there, besides a host of other ex-service veterinarians, whom you will be glad to see.

This is your Association; it is for your benefit; therefore help make it function and be useful to you.

COL. L. A. MERILLAT,
National Commander.
CAPT. J. V. LACROIX,
Assistant National Commander.
LIEUT. A. A. LEIBOLD,
National Adjutant.

VETERINARY CLUB OF PHILADELPHIA

AT the last meeting of our club the following resolution was unanimously adopted:

Resolved:

1. That the Veterinary Club of Philadelphia approves fully of the organization and good work of the Horse Association of America, an Illinois corporation, national in character, with headquarters in Chicago, Illinois.

2. That this club become a member of the Horse Association of America and take one share at $5 per share.

3. That the members of the club be recommended to become members of the Horse Association of America and to solicit their patrons and friends who are interested in horses to help to the extent of one or more shares.

4. That the members of this club designate Dr. George A. Dick to represent them on the Advisory Board of the Horse Association of America. C. S. ROCKWELL, *Secretary.*

COLORADO VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Colorado Veterinary Medical Association was held at Fort Collins on Wednesday, May 26, followed by two days of a practitioners' short course, which the was first of these events held in Colorado. Practically speaking the short course was a continuation of the Association meeting and was held under the auspices of that organization. A good representation of the practitioners of the State was present for the three-day session.

Visitors from out of the State who took part in the program were Dr. H. E. Bemis of Iowa, Dr. W. L. Boyd of Minnesota, and Drs. A. T. Kinsley and C. E. Salsbery of Kansas City.

The address of welcome was made by Dr. Charles A. Lory, President of the Colorado Agricultural College, and responded to by Dr. Charles Lamb, State Veterinarian.

The president's address by Dr. A. N. Carroll pointed out particularly the necessity of the State coöperating with the Government in the accredited herd plan of eradicating tuberculosis. He urged that more attention be given to uniformity in the matter of fees, and also that an urgent invitation to the American Veterinary Medical Association to meet in Colorado in 1921 be extended at the Columbus meeting. Seven new members were added to the roll.

The matter of sterility and abortion was ably handled by Dr. W. L. Boyd in three lectures and two demonstrations on sterile cows.

The surgical work was in charge of Drs. Bemis and Kingman. Dr. Bemis demonstrated his nerve blocking and his operations for fistulous withers, and removal of the nasal septum. Several other operations were performed.

Dr. Bemis also read a paper on "Cæsarian Section in Sows." "Swine Diseases" were discussed by Dr. A. T. Kinsley with some demonstrational material.

Dr. C. E. Salsbery read a paper on "Infectious Keratitis of

Cattle," in which he stated that investigations carried on by their laboratories had revealed two organisms commonly present in this disease, namely, *B. pyogenes bovis* and *B. bovisepticus*.

Dr. A. G. Fisk discussed "County Veterinary Societies" with particular relation to the new one which has been formed in Weld County, Colorado.

The entertainment consisted of a picnic lunch given by the American Veterinary Supply Company on the first day of the meeting, and the annual banquet and ball held on the evening of the 26th.

Altogether the practitioners' short course was highly successful and will probably become an annual event.

I. E. NEWSOM, *Secretary*.

Dr. J. B. Reidy, of Houston, Texas, is now located at Augusta, Me., in charge of tuberculosis eradication work for the Bureau of Animal Industry in coöperation with Dr. W. H. Lynch, State Live-Stock Sanitary Commissioner.

The force of Bureau of Animal Industry veterinary inspectors has been increased at Little Rock, Ark., by the addition of Drs. Grover C. Pieper, Wella E. Hopkins and Charles M. Bell.

Dr. Harry K. Copithorn, of Boston, Mass., has been attached to the force of the Quarantine Division of the Bureau of Animal Industry at Calais, Me., for the inspection of animals imported into the United States.

A Connecticut live-stock owner who recently enrolled in the "Better Sires—Better-Stock" movement reported 23½ cattle kept for breeding. Twenty-three of the animals are purebred cows; the fraction represents a half interest in a purebred bull.

Dr. William P. Jackson, Chico, Calif., has been appointed Resident Secretary, to succeed Dr. C. M. Haring, resigned. Dr. Haring did not feel that he could give the necessary time to the work.

Dr. William E. Muldoon, Manhattan, Kans., has been appointed Resident Secretary for that State, to succeed Dr. J. H. Burke, who resigned.

COMMUNICATIONS

LETTERS OF APPRECIATION

DR. W. H. DALRYMPLE:

My dear and much honored Colleague—Our committee at its last meeting received the cablegram which you together with Drs. Mohler and Eichhorn were kind enough to send me from New Orleans at the occasion of the meeting of the American Veterinary Medical Association.

So long accustomed to so much cordiality and generosity from your grand country, our committee was by no means surprised at the decision of your strong association. But it found a new proof, particularly touching, of the eternal esteem and affection which steadily unite our two nations. It has requested me to express to the American Veterinary Medical Association its sentiments of profound gratitude.

Our committee pronounced the closing of its public subscriptions on the first of January last. It has also decided that its financial intervention shall not go further than this season and terminate on the first of May, 1920. Besides, at that time all the money we have collected shall have been paid out, and the mild season will make existence less hard for our unfortunate brothers who have suffered so much from the winter in the devastated regions.

Our mission being terminated, I shall not, on behalf of the committee, fail to keep you posted as to the use of our funds and those which we owe to your generous contribution. H. VALLEE.

Alfort, France.

DR. A. EICHHORN:

My Dear Colleague—I wish to acknowledge the receipt of your highly esteemed letter of March 12th, and hasten to express in the name of the High School and also for myself the deepest appreciation and thanks for your readiness and sympathy which you have shown towards our cause. Although the appeal you have made in the JOURNAL over-estimates my modest activity along professional lines, and although I regret that Professor Marek has not been given due recognition in the same, as he has a great share in the publishing of our Special Pathology and Therapeutics, nevertheless I have taken cognizance of the appeal with the deepest gratitude

and hope that the same will arouse among our American colleagues the deserved sympathy for our country.

In my letter I have only requested periodicals and other publications. If, however, according to your appeal financial contributions should be received, we would utilize the same for the procurance of books and instruments for our students, who at the present time are not in a position to obtain them; or the funds may be administered as a "Fund of American Veterinarians" by the veterinary colleagues. In the meantime we received the JOURNAL of the American Veterinary Medical Association and also the *American Journal of Veterinary Medicine*. They will be placed in the library of our college as presents of the publishers.

Thanking you for your very friendly and kind support, I am, with personal regards, Sincerely yours,

Budapest, Hungary. PROFESSOR HUTYRA.

THE ARMY BEHIND THE ARMY

There follows an extract from a recent book entitled "The Army Behind the Army," by Major E. Alexander Powell, U. S. A., published by Charles Scribners Sons, 1919. The work may be considered as quasi-official inasmuch as the preface states that it is published by permission of the Secretary of War and with the coöperation of other officials.

To me, and I think it will be to other veterinarians, it is a source of real gratification to read a public acknowledgment of a service well performed by the Army veterinarian. It is not news to the profession, but undoubtedly it is to the general public. I might add that it is additionally gratifying, coming as it does from a source that in years past has shown no great love for the veterinarian.

"I doubt if any branch of the Army did more efficient work in its respective line, and received less credit from the public, than the Veterinary Corps. This lack of appreciation was due, in the first place, to public ignorance of the duties of the corps and the character of its personnel.

"Most people associate a veterinarian with the old-time horse doctor, of rough speech and still rougher manner, who was known to every man and boy in the countryside as Doc.

"The Army veterinarian is a different genus altogether. He is usually as smart in appearance and as well set up as any officer of the line; he is more often than not a university graduate, and

his methods of treatment are as modern and scientific as those of a surgeon or a medical specialist."—Pp. 464-468.

The section goes on to give an extended outline of the work and duties of the Army veterinarian.

W. T. CONWAY, *Inspector-in-Charge,*
New Haven, Conn.

"HONOR TO WHOM HONOR IS DUE"

The following letter will be of interest to many of our readers:

From the Adjutant General of the Army
To CAPTAIN HORACE B. F. JERVIS,
6 Charles Street, Houlton, Maine.

There is forwarded herewith by registered mail a Meritorious Service Citation Certificate, awarded to you by the Commander-in-Chief, American Expeditionary Forces, for exceptionally meritorious and conspicuous services in Europe.

WM. S. BIDDLE, *Adjutant General.*

The citation was dated May 2, 1920, and signed by John J. Pershing, Commander-in-Chief.

TUBERCULOSIS CONTROL

Research workers in any portion of the field of bovine tuberculosis who have scientific results or control policies bearing directly on control work and which they wish to put before the American Veterinary Medical Association are invited to send as soon as possible a brief, clearly worded statement and argument to the undersigned for consideration by the A. V. M. A. International Committee on Control of Bovine Tuberculosis.

M. H. REYNOLDS, *Chairman,*
University Farm, St. Paul, Minnesota.

NECROLOGY

Dr. Archibald K. Robertson, formerly Chief Inspector of the Bureau of Animal Industry in charge of New York and New Jersey under Commissioner J. M. Rusk, died in Brooklyn on June 7. At the time of the epizoötic of contagious pleuro-pneumonia, a disease which threatened to wipe out the dairies of the East and cost millions to the cattle industry, Dr. Robertson was active in the eradication of this peril. He was born in Iowa in 1858 and came to Brooklyn in 1884. He was graduated from the American Veterinary College in 1886.

MISCELLANEOUS

U. S. RETIREMENT LAW AS IT AFFECTS VETERINARIANS

THE Civil Service Retirement Law enacted by Congress and approved by the President May 22, 1920, provides that beginning at the expiration of ninety days following the passage of the Act all employees in the classified Civil Service of the United States who have on that date or shall have on any date thereafter, reached the age of 70 years and rendered at least 15 years of service computed as prescribed, shall be eligible for retirement on an annuity; mechanics, city and rural letter carriers and postal clerks shall be eligible for retirement at 65 years of age, and railway postal clerks at 62 years of age.

The amount of annuity which retired employees shall receive is fixed under six classifications, namely:

Class A—Employees who have served for a total period of 30 years or more, the annuity shall equal 60 per cent of such employee's average annual basic salary for the 10 years next preceding the date in which he or she shall retire. In no event shall an annuity in this class exceed $720 or be less than $360 per annum.

Class B—Employees who have served for a total period of 27 years or more, but less than 30 years, the annuity shall equal 54 per cent of such employee's average annual basic salary, but not to exceed $576 or be less than $388 per annum.

Class C—Employees who have served for a total period of 24 years or more, but less than 27 years, the annuity shall equal 48 per cent of such employee's average annual basic salary, but not to exceed $576 or be less than 388 per annum.

Class D—Employees who have served for a total period of 21 years or more, but less than 24 years, the annuity shall equal 42 per cent of such employee's average annual basic salary, but not to exceed $504 or be less than $252 per annum.

Class E—Employees who have served for a total period of 18 years or more, but less than 21 years, the annuity shall equal 36 per cent of such employee's average annual basic salary, but not to exceed $432 or be less than $216 per annum.

Class F—Employees who have served for a total period of 15 years or more, but less than 18 years, the annuity shall equal 30

per cent of such employee's average annual basic salary, but not to exceed $360 or be less than $180 per annum.

Secretary of Interior John Barton Payne, who was selected by the Cabinet members to decide the policy of the Government in the retention of superannuated Government employees under the new retirement law, rendered a decision recently that brought much comfort to the employees who had reached the age of 70 years but had not served for a period of 15 years. His decision recommends that each department head shall decide whether such persons shall be retained in the service or not. This decision was a modification of a previous one to the effect that those who had reached the age of 70 must automatically be separated from the service, thus depriving many well-deserving employees of an annuity because they had not served the full period of 15 years. To follow the strict ruling of the law in this matter and arbitrarily and automatically dismiss these people would be to inflict upon them a grave injustice and to begin the execution of the retirement law in a manner altogether contrary to the plain purpose for which it was enacted.

MONTHLY CONTRIBUTIONS TO BE WITHHELD FROM EMPLOYEES' SALARIES

The Act provides in Section 8 that "beginning on the first day of the third month next following the passage of this Act and monthly thereafter there shall be deducted and withheld from the basic salary, pay or compensation of each employee to whom this Act applies, a sum equal to 2½ per cent of such employee's basic salary, pay or compensation, this fund to be invested by the Secretary of the Treasury in interest-bearing securities of the United States. In case an employee shall become separated from the service before becoming eligible for retirement or an annuity, the total amount of deductions of salary, pay or compensation with accrued interest computed at the rate of 4 per cent per annum compounded on June 30 of each fiscal year, shall upon application be returned to such employee. In case an annuitist shall die without having received in annuities an amount equal to the total amount of deductions from his or her salary, pay or compensation with interest thereon at 4 per cent per annum compounded as herein provided up to the time of his or her death, the excess of said accumulated deductions over the said annuity shall be paid in one sum to his or her legal representatives upon the establishment of a valid claim therefor, and in case an employee shall die without

having reached the retirement age or without having established a valid claim for annuity, the total amount of deductions with accrued interest as herein provided shall be paid to the legal representatives of such employee, provided that if in case of death the amount of deductions to be paid under the provisions of this section does not exceed $300."

There are many features of the retirement law that are unsatisfactory to most employees, but after many years of endeavor it is the very best law that could be obtained. It is probable that it will be amended from time to time by Congress and to that end employees are now making preparation for the introduction of bills in Congress to modify the plan. It is believed by many that the annuity should be much larger for the employees who contribute the larger annual amounts from their salaries.

Among the Bureau of Animal Industry employees who will be retired on August 21, 1920, are 4 veterinarians, 36 lay inspectors, 3 clerks and 1 laborer.

HONORARY DEGREE FOR DR. RUTHERFORD

The following extract from University of Toronto *Monthly* for June, 1920, is self-explanatory:

"A year ago Dr. John Gunion Rutherford was offered the degree of Doctor of Veterinary Science, but sudden illness prevented him from being present to accept it, and it is a pleasure to have him here now to receive this deferred honor. His varied and outstanding work in public life of the Dominion procured for him in 1910 from His Majesty the title of C. M. G., but in asking you to bestow upon him this degree of Doctor of Veterinary Science, the desire of the senate of the University is to recognize what we deem to be his most important service, that of improving the live stock of the Dominion and probably doing for agriculture, which is the basic industry of our country, what no other man has done to the same extent in this field."

Dr. Hadleigh Marsh, of Helena, Mont., has been appointed by President Cary, Resident Secretary for Montana, to succeed Dr. E. H. Raleigh, who is leaving the State.

Dr. Clark H. Hays, of Indianapolis, Ind., has been placed in charge of the field work of the Bureau of Animal Industry at Lincoln, Nebr., vice Dr. S. E. Cosford, deceased.